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Reliability Considerations

For Delay-Tolerant Networks

Update: IETF-125

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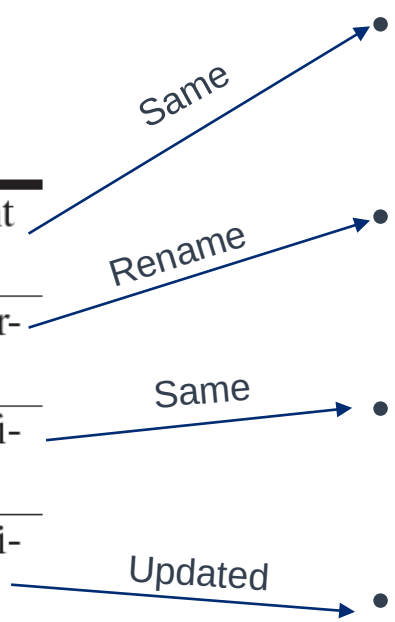
Overview

- **Custodial behaviors needed**
  - Original CFDP and lessons learned from MRN
- **But…custody is about reliability**
  - DTN has all features needed for reliability
  - Need to select which features to use and when
- **But…reliability is about user-desired behaviors**
  - Keep Storage Available
  - Delegate Monitoring
  - Extend Platform Life
  - Preserve Data Policies
- **But…missions want service agreements**
  - Reliability is a class of service
  - Classes of services are not technical mechanisms
- **And…mechanisms are provider dependent**
  - Usually expressed as service agreement
  - With acknowledgement of applying service
  - Different providers might use different mechanisms

Reliability Services

Example: Reliability Classes implemented at Bundle Layer

Class	Name	Description
0	No Reliability	No expectation of persistent storage.
1	Best-Effort Retention	Store data if unreserved storage available.
2	Guaranteed Custodian	Use storage reserved specifically for this data.
3	Redundant Custodians	Ensure data is stored in multiple locations.



Class 1 Best Effort Transmission
- No expectation of persistent storage

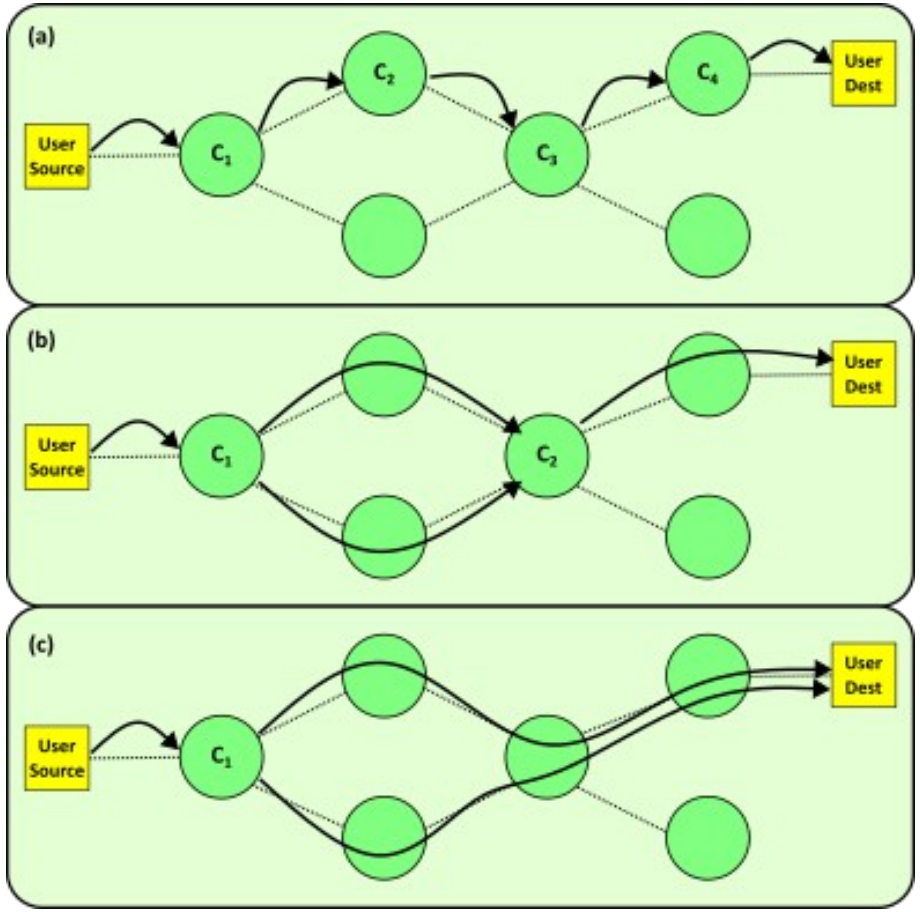
Class 2 Store-Until-Forward
- Bundles can be deleted once forwarded

Class 3 Guaranteed Custodians
- Every path will contain at least 1 node able to serve as custodian

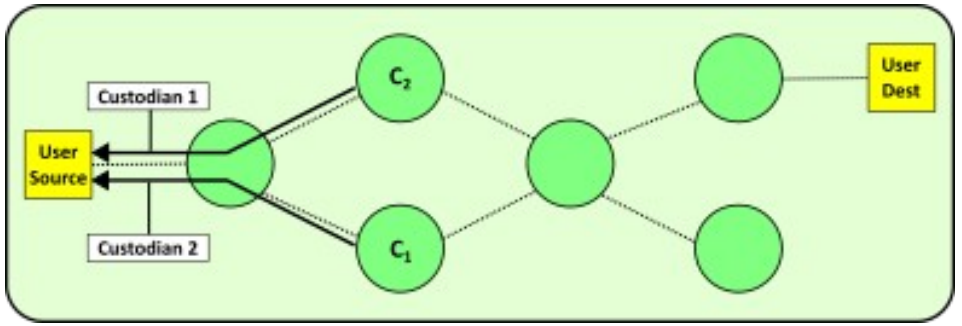
Class 4 Independent Custodians
- Data sent over independent paths with each path containing at least 1 node able to serve as custodian

Class 3/Class 4: Custodians

Class 3: 1 to N custodians along a path.



Class 4: 1 to N custodians along 1 to M paths.

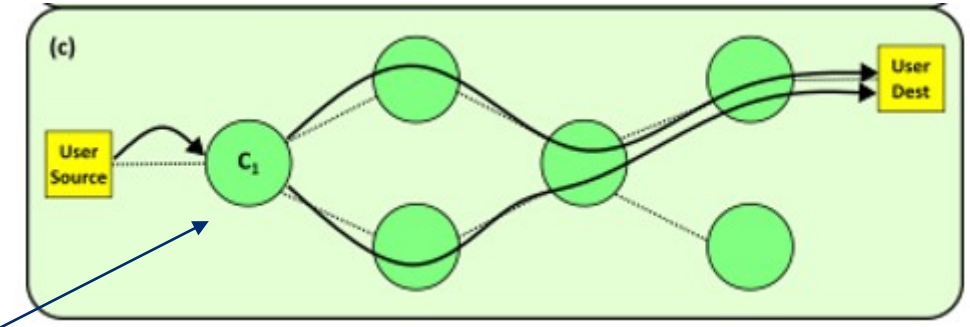


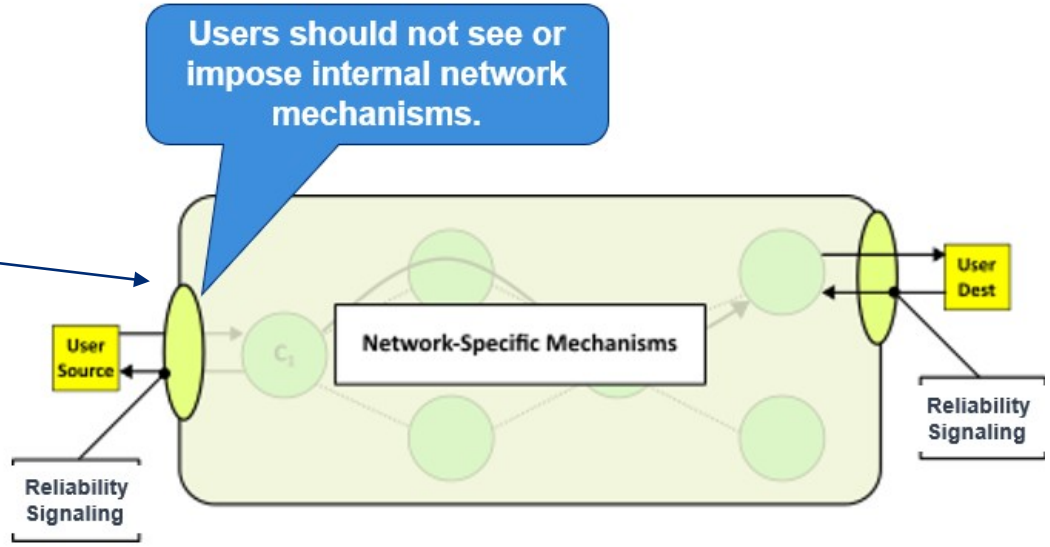
Custody Signaling Discussion

- **What are we signaling?**
  - Signaling custody means a BPA is now a custodian for a bundle (or bundles)
  - Signaling reliability means the network agrees to handle data in some way

- **Issues with Custody Signaling**
  - Signals a node has taken custody
  - Ex: Transit network signals custody at edge nodes.
  - User source believes C1 is custodian
  - Does C1 need to store all traffic incoming to the network?

- **Recommend Reliability Signaling**
  - Signals that a network has taken custody
  - Allows same behavior to the user device
  - Does not pre-suppose mechanism
  - Does not leak internals of (transit) network





Questions

- The Store-Until-Forward distinction
  - Basic RFC9171 behavior is Store-Until-Forward
  - “Custodial” Behaviors preserve storage even after forwarding

- Can destination BPAs accept custody?

- Does a Custodian mean “the node that stores the data” or “the node that reports data will be stored by someone and perhaps tracks who that is”

- Do we want custody signaling or reliability signaling, or both?

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