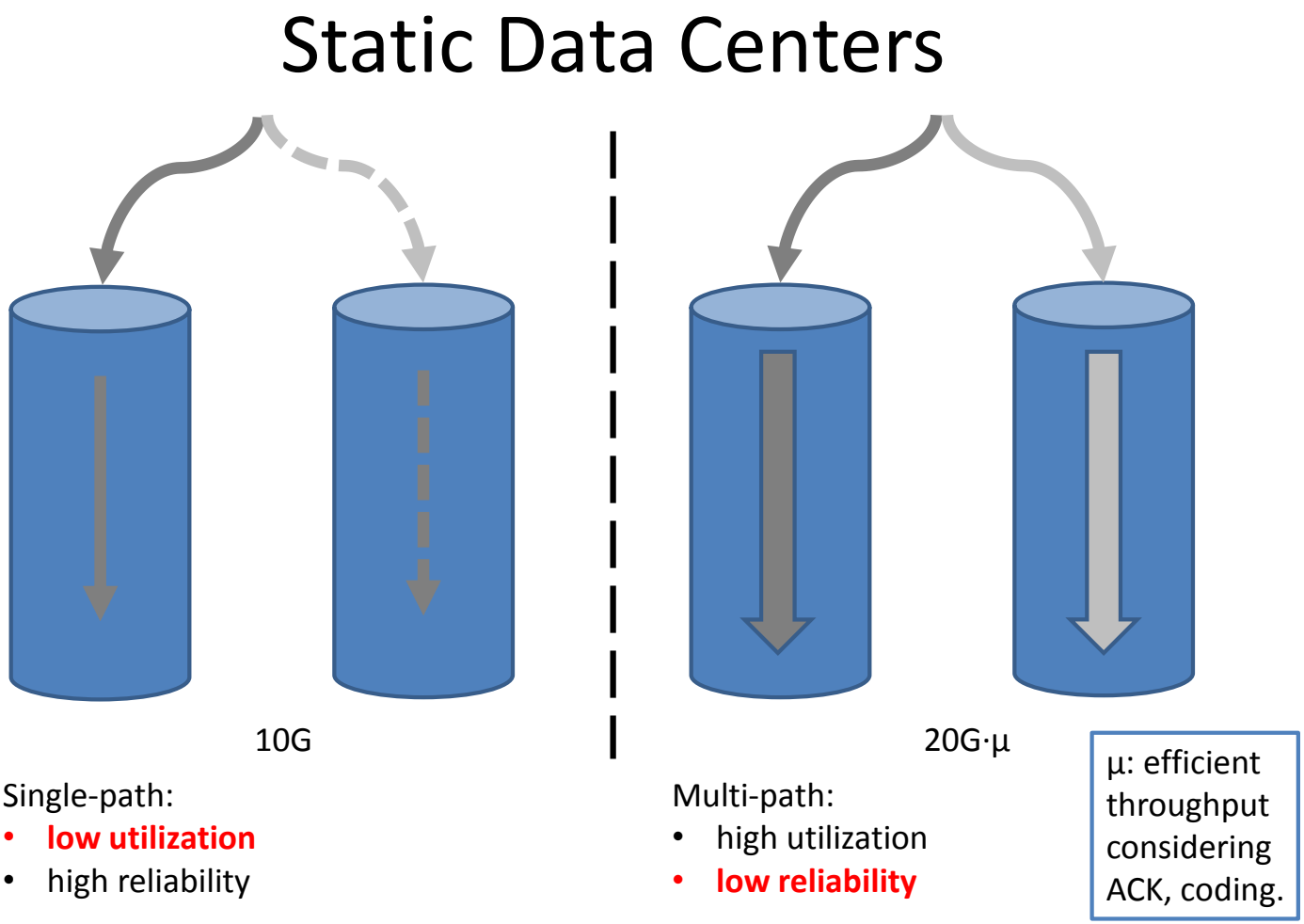
Multi-path TCP in Data Centers

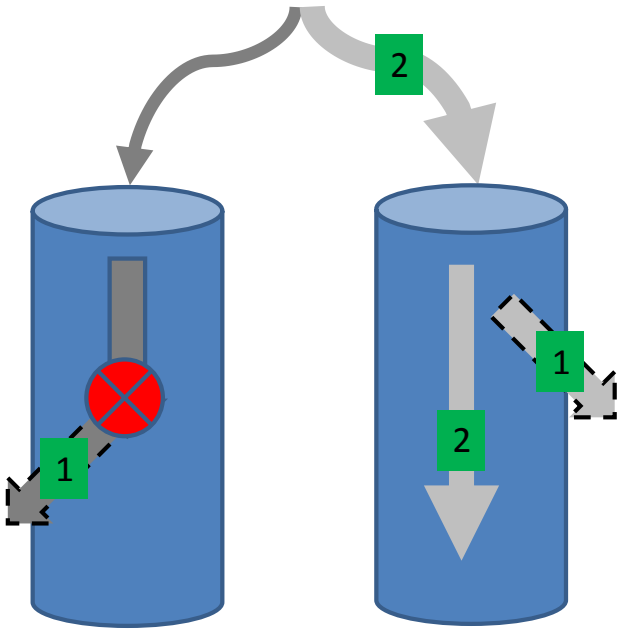
Trade-off between reliability and utilization



Multi-path TCP in Data Centers

Low reliability due to drops and retransmission

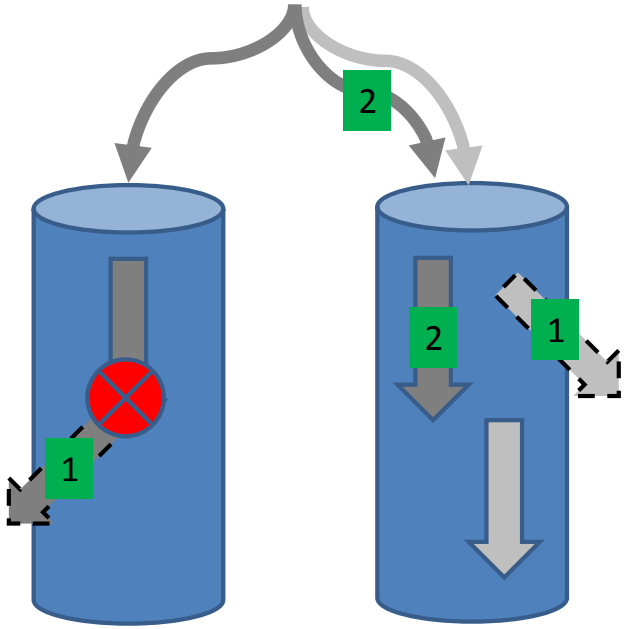
Static Data Centers



10G·μ-T(2,2)

Multi-path failures:

1. Drop two subflows;
2. Retransmit initial flow.



10G·μ-T(2,2)

Multi-path failures:

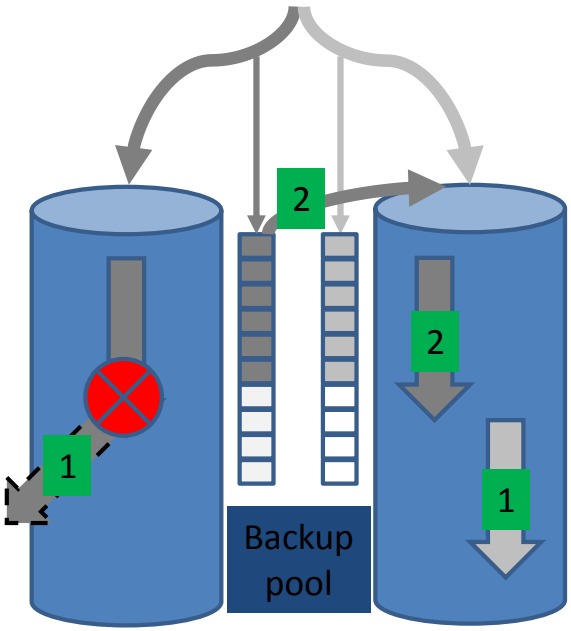
1. Drop two subflows;
2. Retransmit two subflows;
3. Decoding after transmit.

T(d,r): extra overhead of drops and retransmit.

Multi-path TCP in Data Centers

High reliability through flows backup

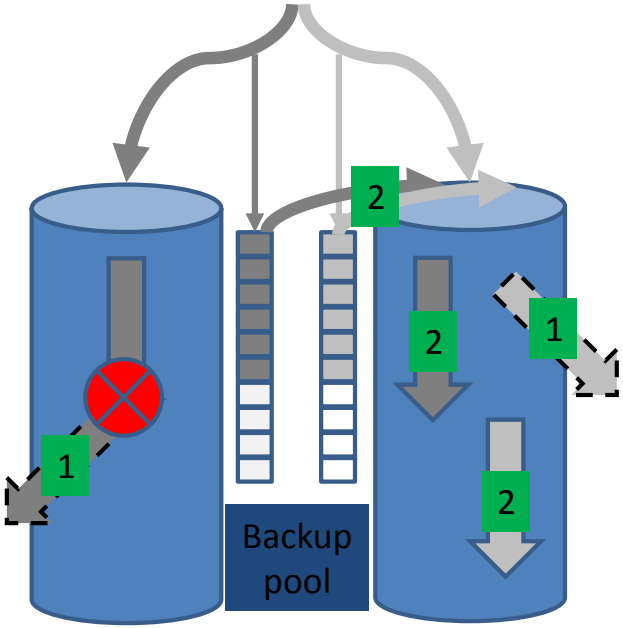
Static Data Centers



10G·μ-T(1,1)

Multi-path failures by backup:

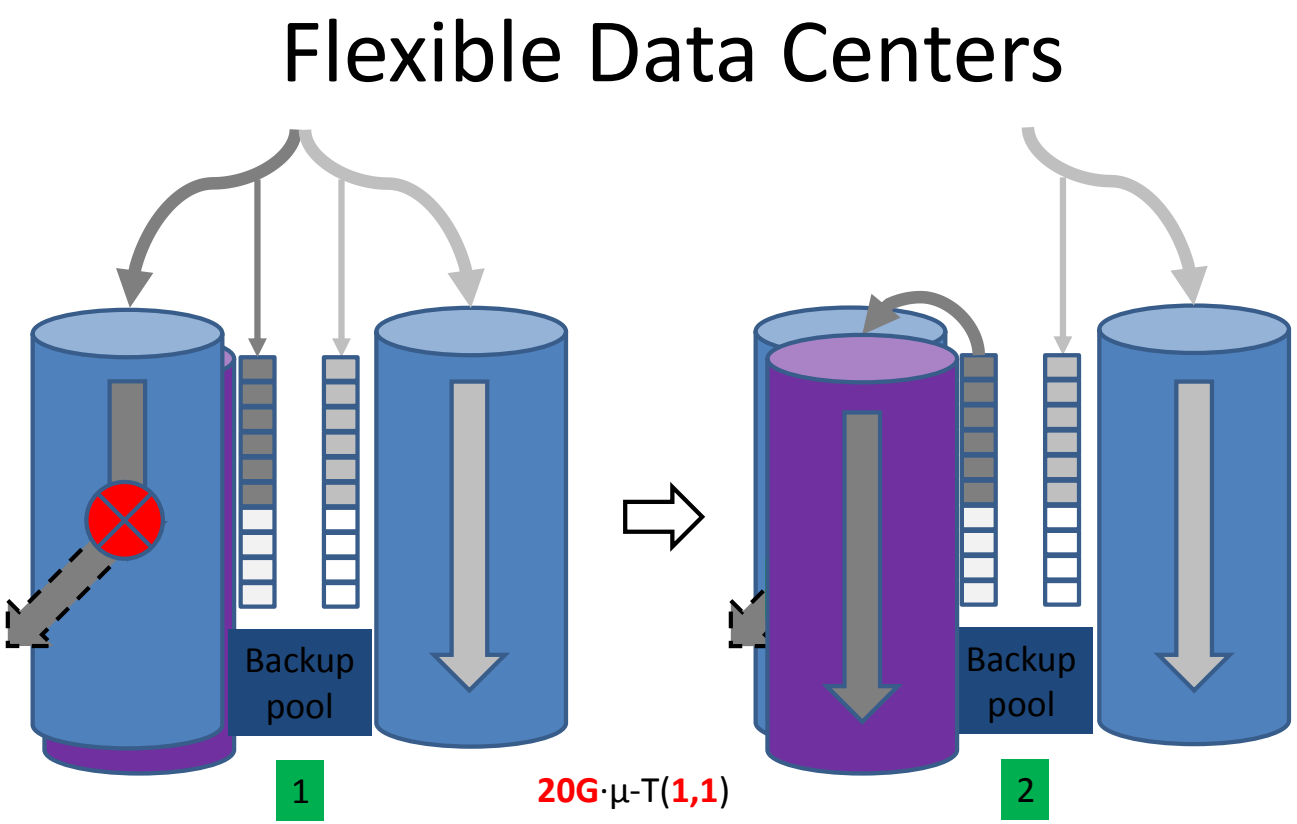
1. Drop one subflow;
2. Retransmit one subflow;
3. Decoding after transmit.



10G·μ-T(2,2)

Multi-path failures by backup:

1. Drop two subflows;
2. Retransmit two subflows;
3. Decoding **as transmitting**.



Multi-path failures by backup:

1. Drop **one subflow**;
2. Retransmit **one subflow**;
3. Decoding **as transmitting**.

Failures handling and Multi-path TCP

Failures handling technologies

- **Flow backup** reduces the overhead of drops and retransmission: T(2,2) $\rightarrow$ T(1,1).
- **Flexible switching** improves the capacity and reduces the delay: 10G $\rightarrow$ 20G, decoding after $\rightarrow$ as transmitting.

Multi-path TCP technologies

- Block ACK: congestion control
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