MFTP: A Transport Protocol for the Information-Centric MobilityFirst Network

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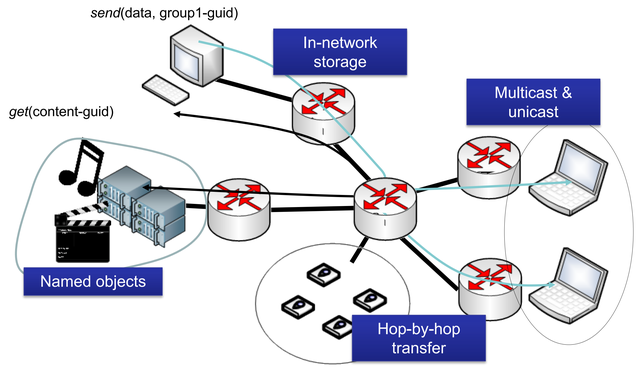
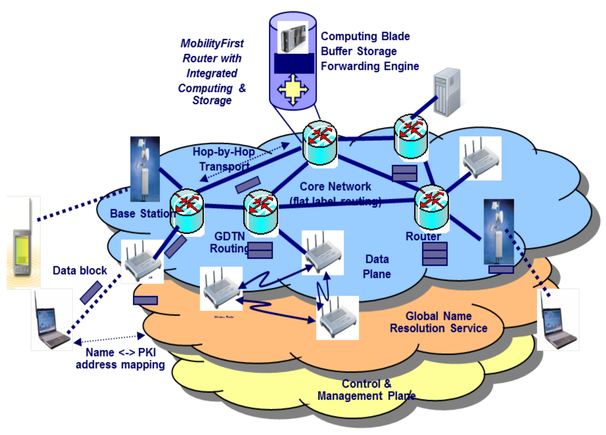
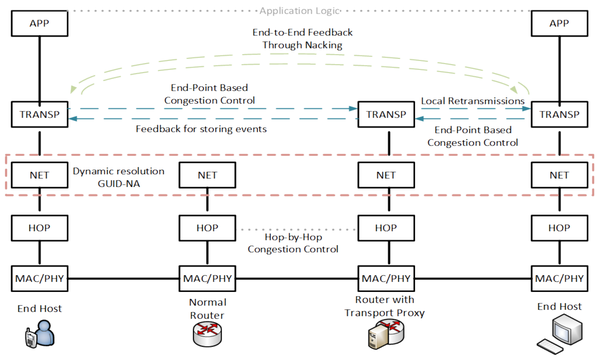
TP requirements for ICN



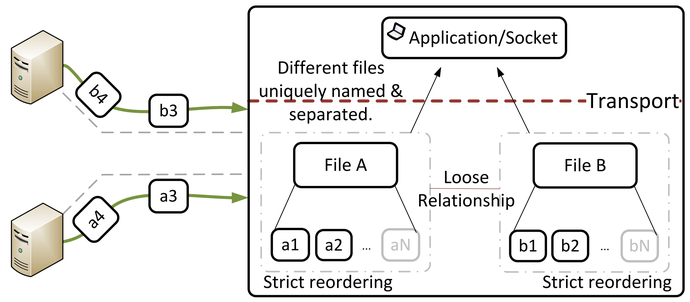
- Fragmentation and end-to-end re-sequencing
- Lightweight end-to-end error recovery
  - Parsimonious mechanisms to deal w. link/node failures
- In-network transport proxies
  - Provides temporary storage to deal with mobility/disconnection
  - Can be delegated with transport layer responsibilities
- Optional flow and congestion control mechanisms
  - Must be effective for long transfers, but minimal overhead for short transfers
- Scalable multicast delivery mechanisms
  - Efficient and reliable delivery

MobilityFirst architecture & MFTP



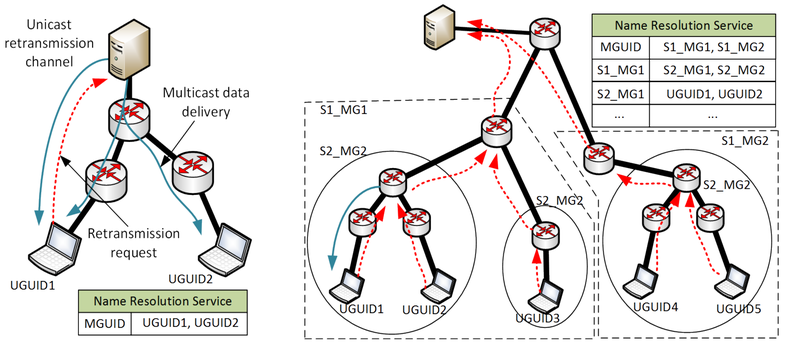


Segmentation & sequencing



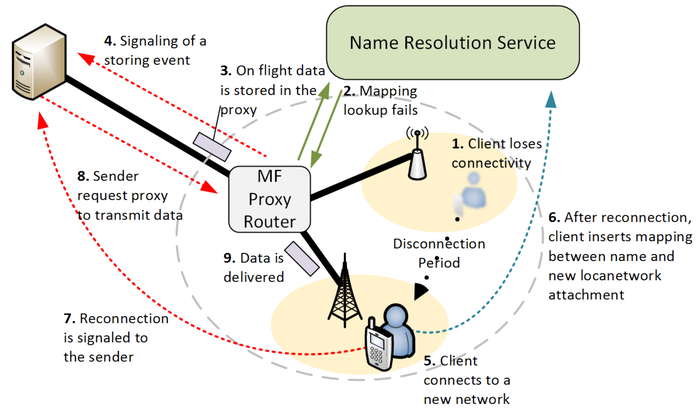
- In-order delivery for chunks of each content
- No head-of-line blocking for content arriving out-of-order

Multicast



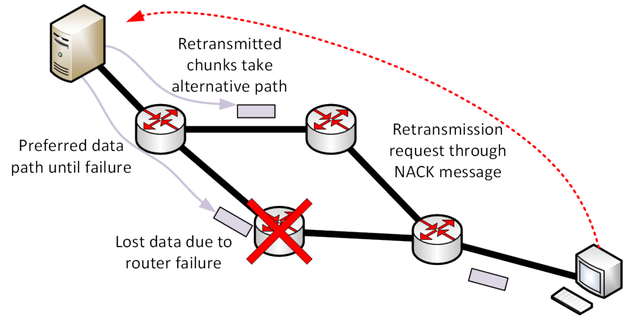
- Dynamically formed multicast group identified by a special GUID which is recursively mapped into a group of GUIDs.
- Reliability is achieved by hierarchical aggregation of reTx requests

In-network transport proxy



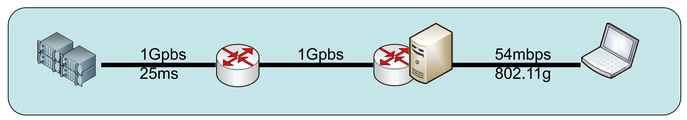
- Store chunks whose destination is temporarily not reachable, due to mobility or disconnection.
- Re-schedule to send from the proxy when conn recovers.

End-to-end error recovery



- Relying on NACKs: dst sends reTx requests when anticipated data didn't arrive.

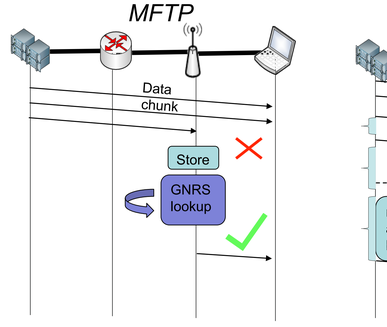
Demo setup & sample results from GENI and ORBIT experiments

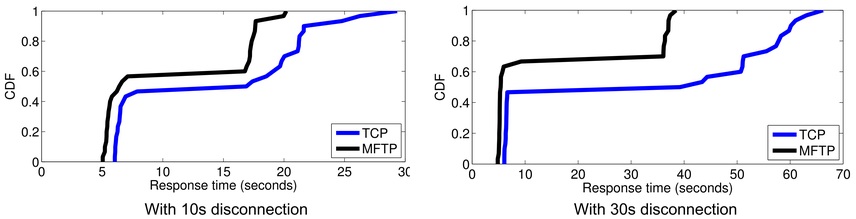


- Experiment: client retrieves a 10MB file
- WiFi connection is on for 10s, and is down for 10s
- Client requests the file at random time in first 10s
- If transfer is not complete in 10s, it experiences disconn
- Continuously repeat the experiments, with MFTP/TCP

- TCP/IP: sender retransmits, based on a timer whose timeout value increases exponentially when the disconn. persists.
- MFTP: stores data in case of disconn. An NA and next-hop lookup is triggered when the storage timer expires and it retransmits only when association is recovered.

The setup was evaluated globally on GENI and locally on ORBIT.





CDF of response times