Performance analysis of FTP versus CCNx

Reza Tourani, Travis Mick,
Frank Natividad, Satyajayant Misra

Computer Science Department
New Mexico State University

Outline

- Introduction and Motivation
- Problem Definition
- Testbed Setup
- Numerical Results
- Conclusion

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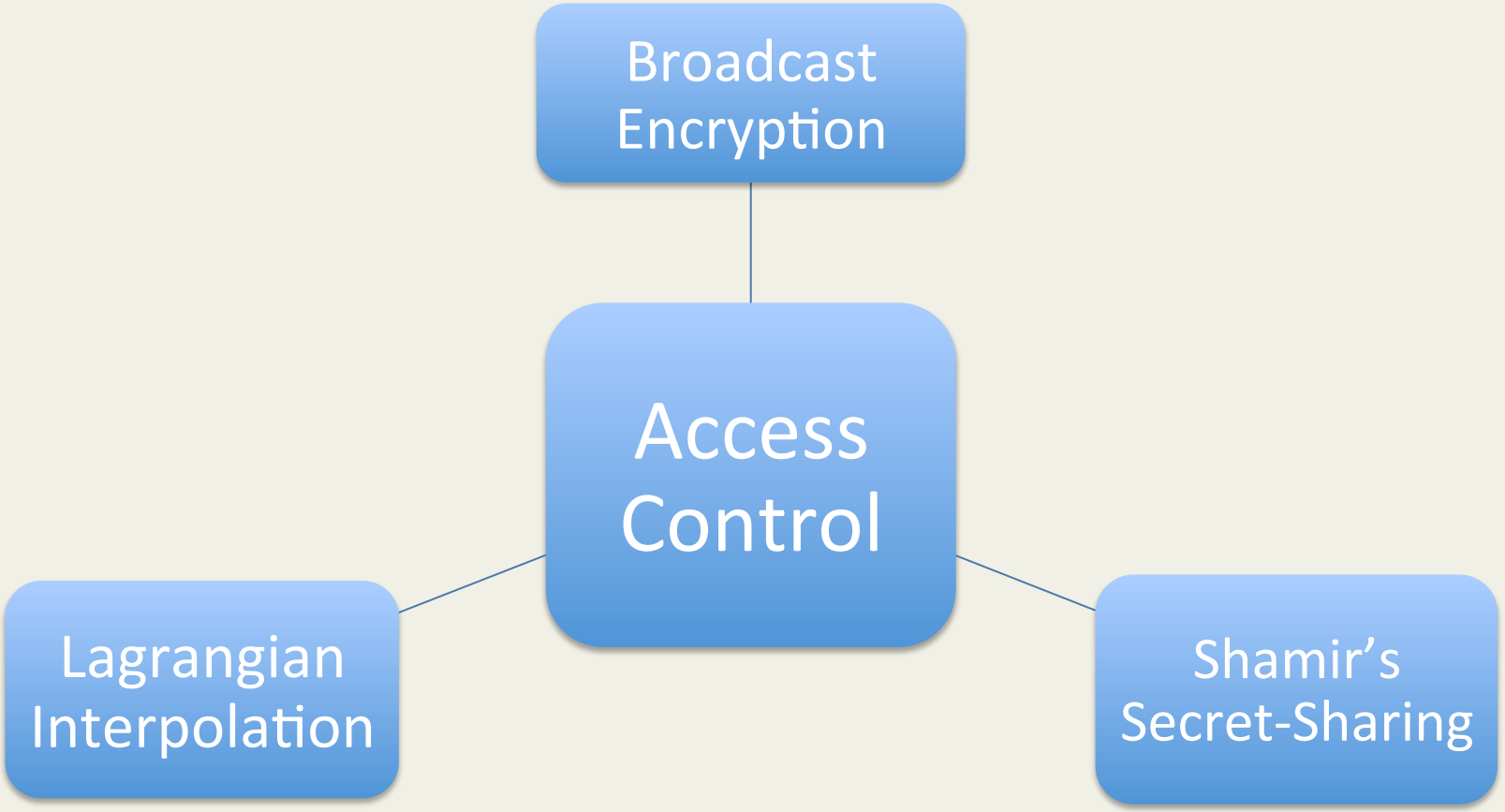
Secure Content Delivery in ICN*

(Access control)



*S. Misra, R. Tourani, and N. E. Majd. Secure Content Delivery in Information-Centric Networks: Design, Implementation, and Analyses. In Proceedings of the 3rd ACM SIGCOMM Workshop on Information Centric Networking (ICN 2013).

Secure Content Delivery in ICN

- **Server**
  - Polynomial and shares generation
    (generation of ‘’n+t’’ shares, one share per client).
  - *Enabling block (EB)* generation
    (key encryption with ‘’t’’ shares).

- **Client**
  - Secret extraction at the client
    (legitimate client uses its share and the ‘’t’’ shares in EB to extract the key).

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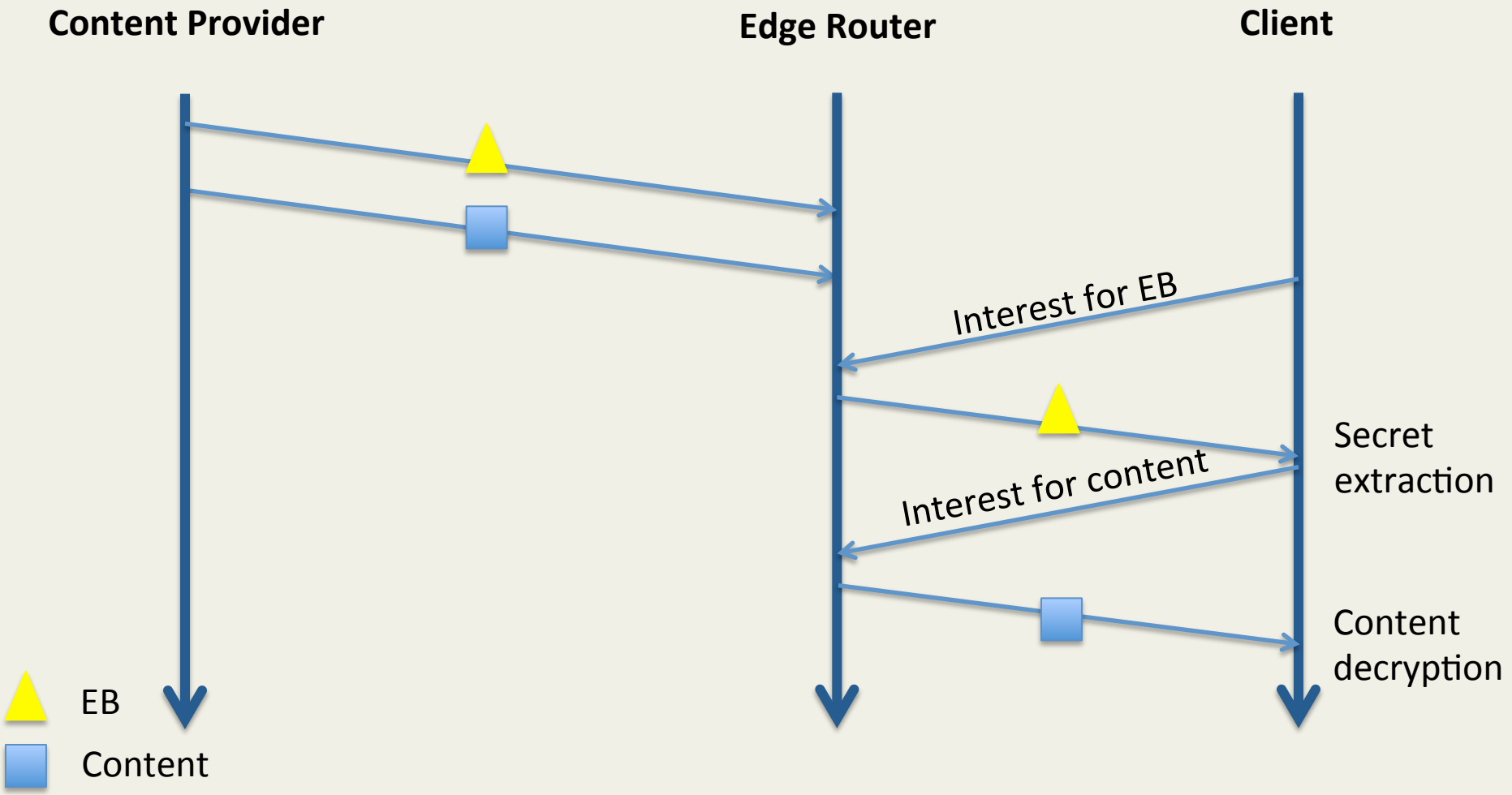
Secure Content Delivery in ICN



Secure Content Delivery in ICN

Server's pre-computation reduces the computation at the client side.

t (in million)	0.1	0.3	0.5	0.7	1
Laptop Extraction (s)	0.14	0.46	0.71	1.03	1.34
Smart phone Extraction (s)	1.16	3.86	5.92	7.44	10.65
Enabling block size (MB)	1.2	3.6	6	8.4	12

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Problem: Performance of CCNx vs. FTP

Comparing the performance of CCNx-0.7 and FTP as the baseline communication.

Our criterion is defined as the content download time.

Testbed Setup

- **Content providers**
  - 3 nodes: 2.4 GHz Intel Core i7, 8 GB RAM.
- **Content forwarder**
  - 4 nodes: 2.5 GHz Intel Core 2 Quad, 3.8 GB RAM.
- **Clients**
  - 6 nodes: 1.66 GHz Intel Centrino Duo, 2.5 GB RAM. (Stationary)
  - 1 node: 3 GHz Intel Xeon Quad Core, 2 GB RAM. (Stationary)
  - 3 Nexus 4: 1.5 GHz Quad core, 2GB RAM. (Mobile)
  - 1 Nexus 5: 2.3 GHz Quad core, 2GB RAM. (Mobile)
- **Access point**
  - 802.11 n
- **Switches**
  - 100 Mb/s switches

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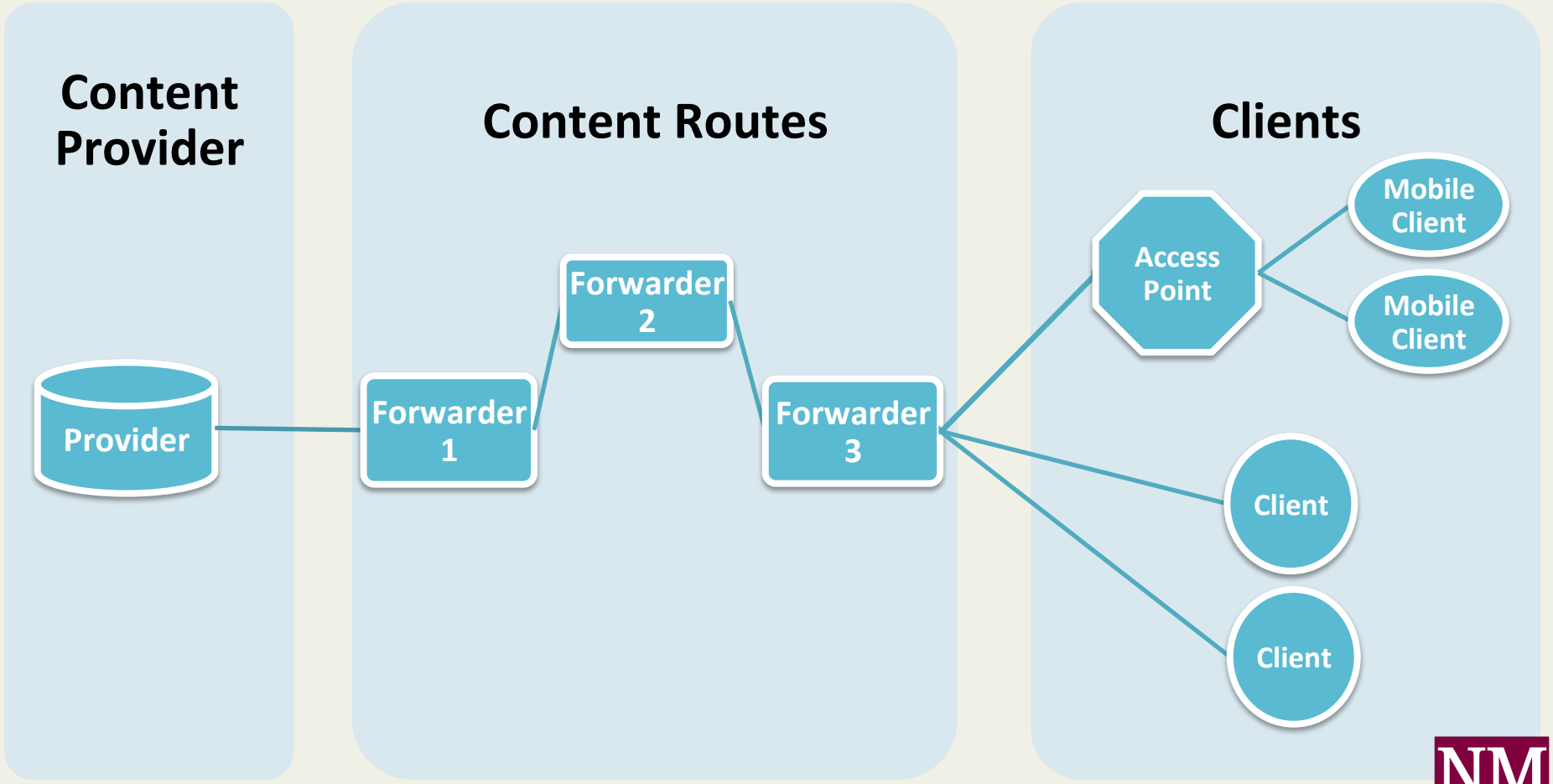
Testbed Setup



Test Setup

- Using the CCNx-0.7 *ccnputfile* and *ccngetfile* tools to store/retrieve contents to/from the content provider.
- One client requests the content from the provider.
- Caching was enabled on all the routers.
- Various content objects (1 MB, 10 MB, 100 MB, 200 MB, and 500MB).
- For the FTP client and server, we used the GNU Wget package.

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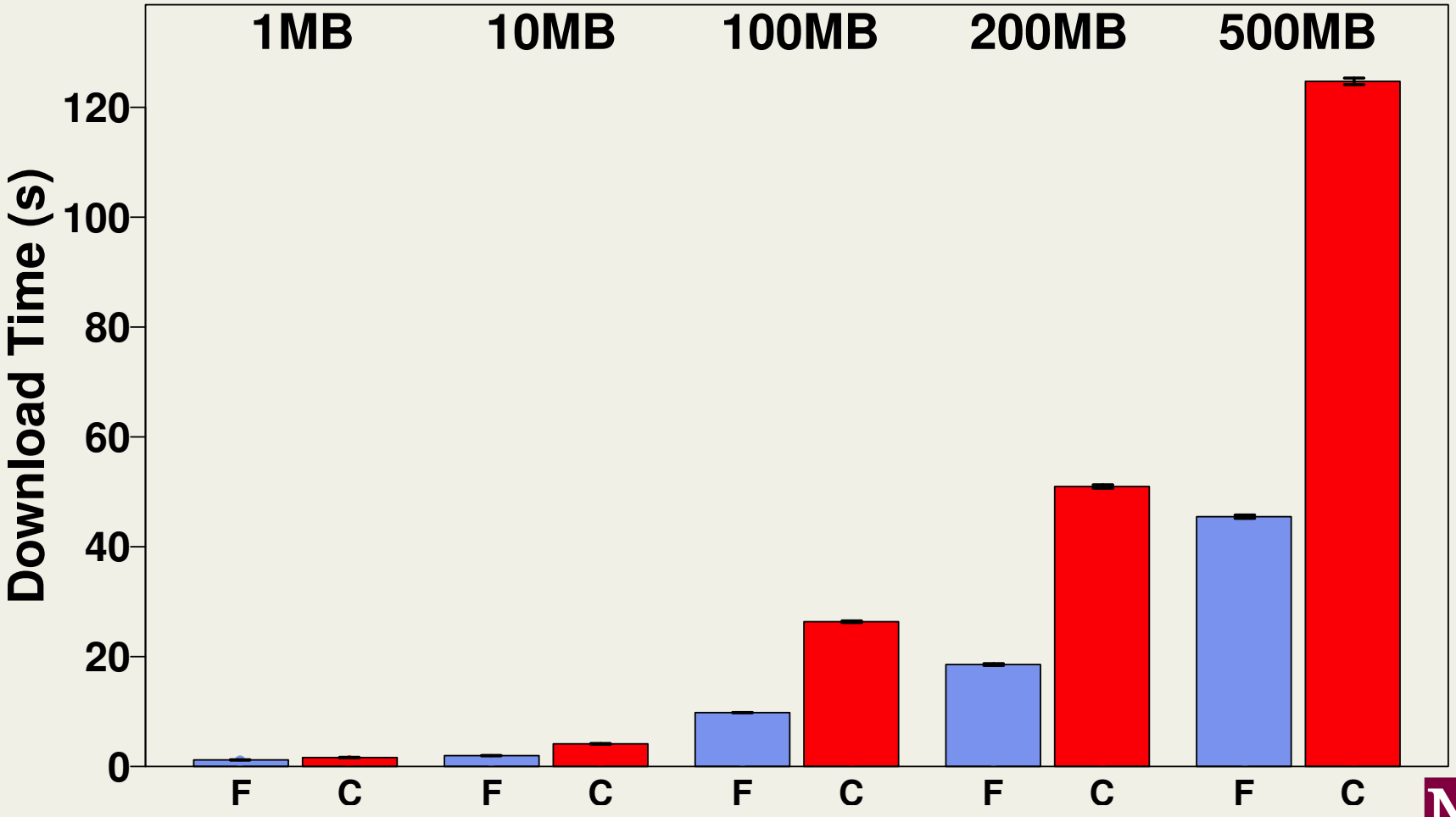
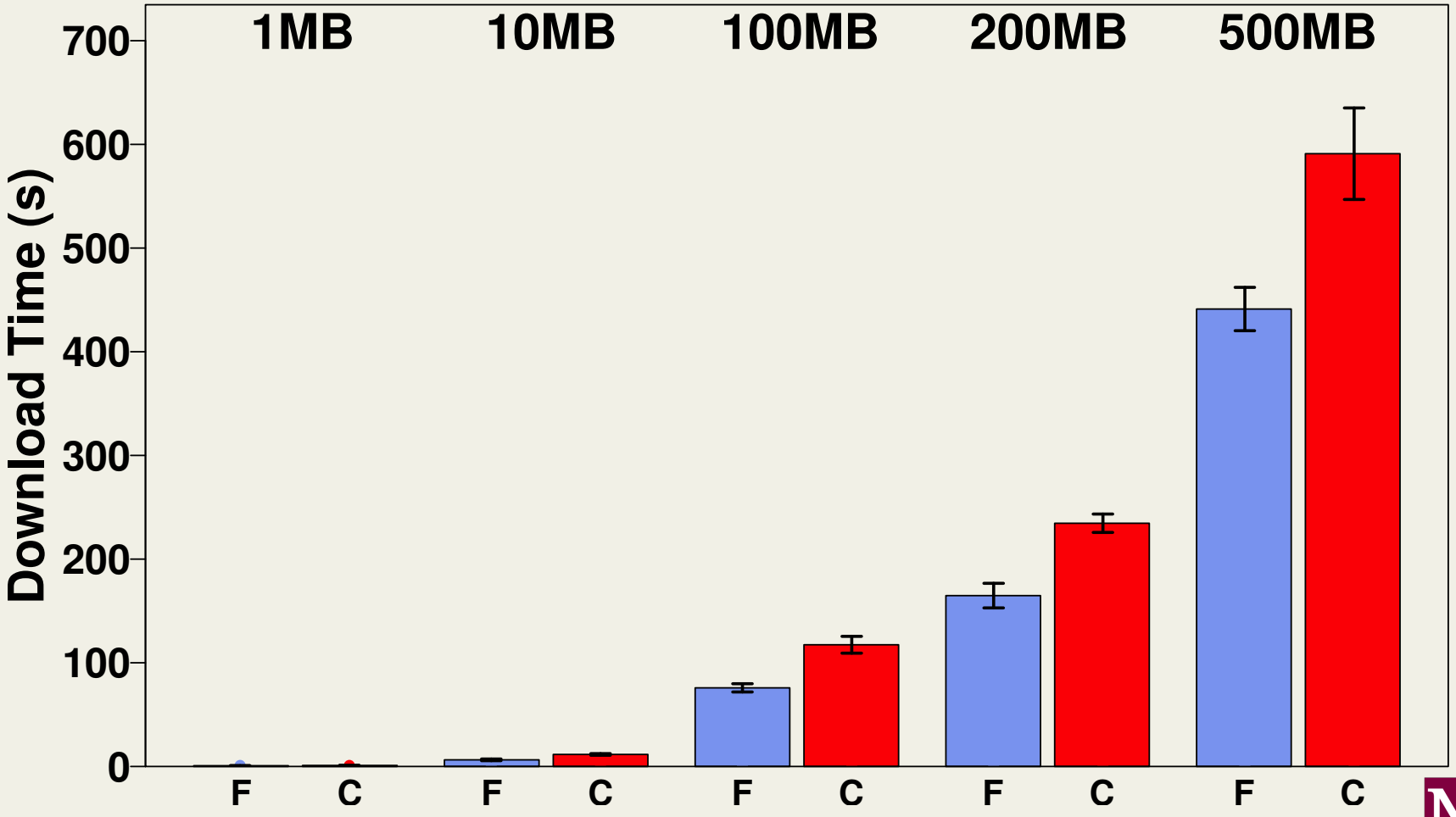
Stationary Client



Mobile Client



Effect of Cache Distance on the Stationary Client Download Time CCNx 0.7

	CCNx			FTP
Content Size	Local Cache	1-hop	4-hop	4-hop
1 MB	1.54	1.62	2.21	1.19
10 MB	3.21	4.11	9.13	1.97
100 MB	12.92	26.34	70.47	9.81
200 MB	24.87	50.93	155.54	18.54
500 MB	57.20	124.73	326.49	45.46

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Conclusion

- FTP is supported by the TCP's sophisticated AIMD congestion control algorithm and pipelining versus static pipelining of CCNx.
- Content store operations (the same delay was observed in *ccnrm* tool).
- The need for a sophisticated congestion control and flow control algorithms for CCN.

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Effect of Cache Distance on the Stationary Client Download Time CCNx 0.8

	CCNx		FTP
Content Size	Local Cache	1-hop	3-hop
1 MB	0.61	0.65	0.30
10 MB	1.98	2.91	1.11
100 MB	9.01	25.25	9.27
200 MB	15.49	49.79	18.27
500 MB	35.04	123.70	45.41

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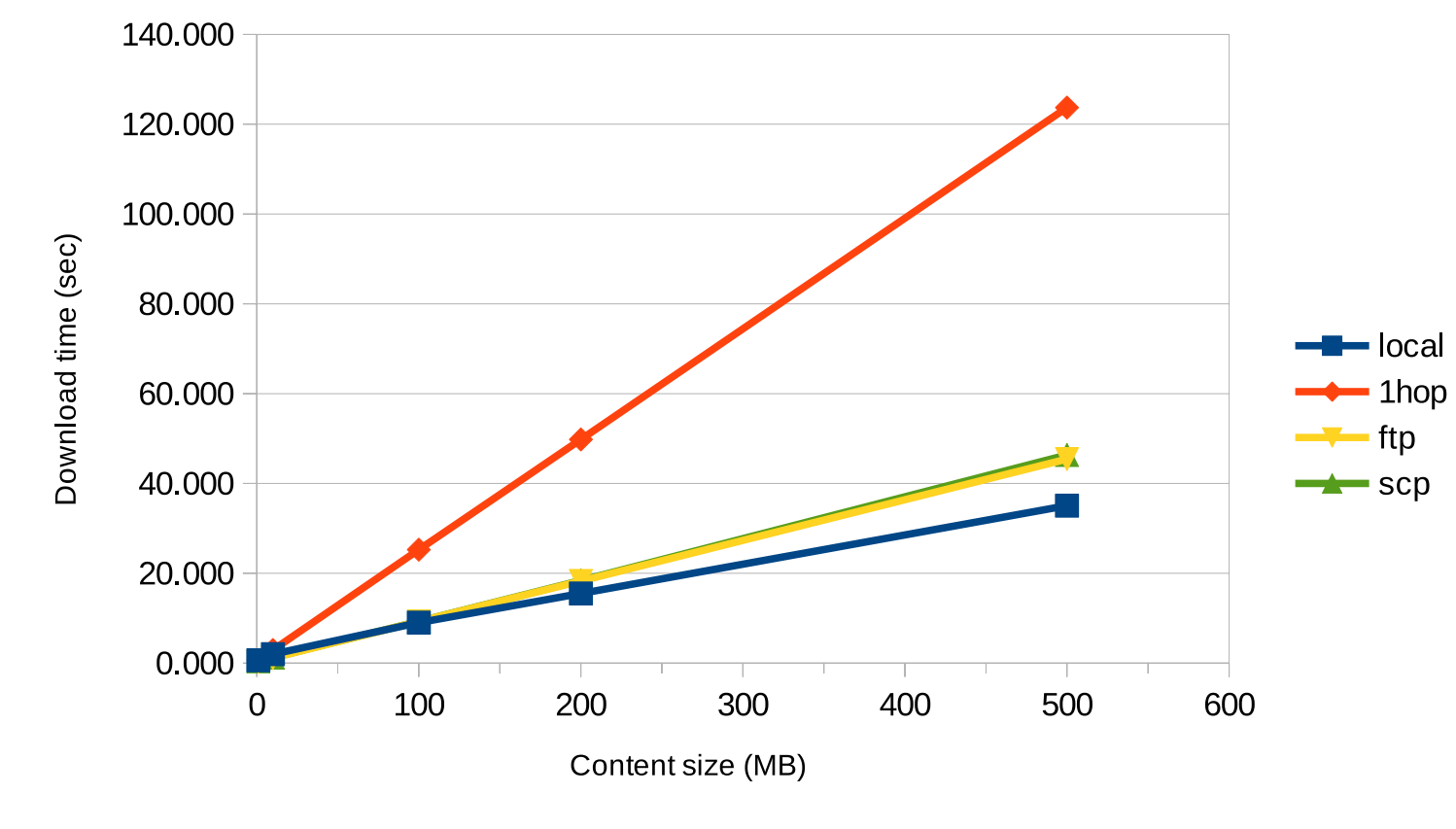
Effect of Cache Distance on the Stationary Client Download Time CCNx 0.8



Thank you!