

MOTIVATION

Traffic Generation/Characterization

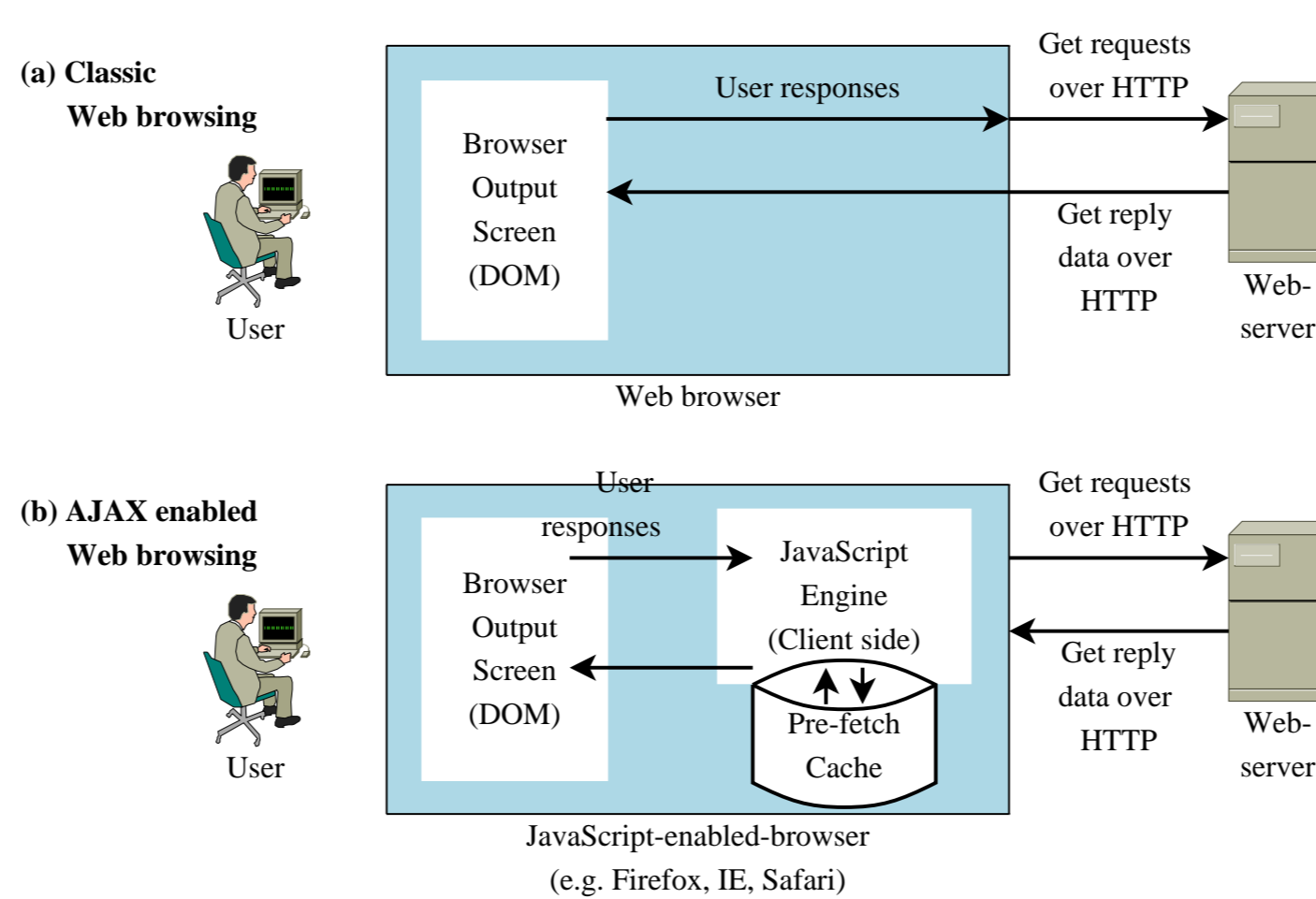
- How does traffic look like?
- What is the impact of new application?
- What are the underlying reasons?

AJAX Features

- Impact of prefetching?
- Meaning for future AJAX application projects.

Google Maps as a representative of AJAX applications.

AJAX VS. TRADITIONAL WEB



SUMMARY

- Number of requests per session increases.
 - Number of transferred bytes per connections/session increases significantly.
 - Inter-request-times: Human impact decreases significantly.
- ⇒ Heavier and more bursty traffic with AJAX applications.

SUMMARY OF TRACES

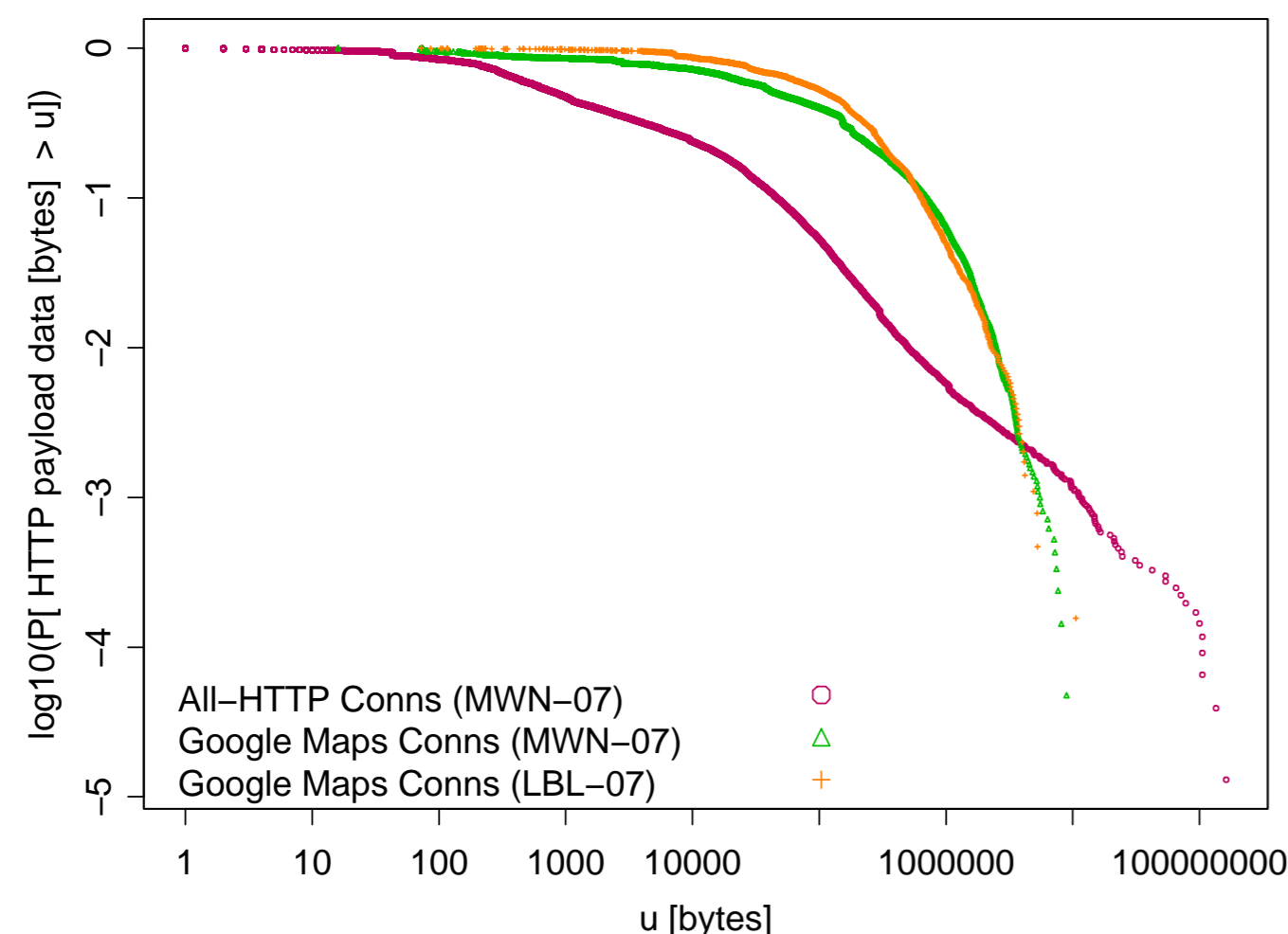
Trace	Size	Duration	Start Date	#Req Total	#Req GMaps	#Sessions GMaps
MWN-07	2.4 TB	32h 15min	Feb 24th 2007	30,0 M	222 K	1127
LBNL-07	214 GB	app. 9h	Mar 3rd 2007	2,0 M	82 K	354
MWN-05	306 GB	47h 35min	Aug 5th 2005	10,8 M	101 K	164

GOOGLE MAPS USES ...

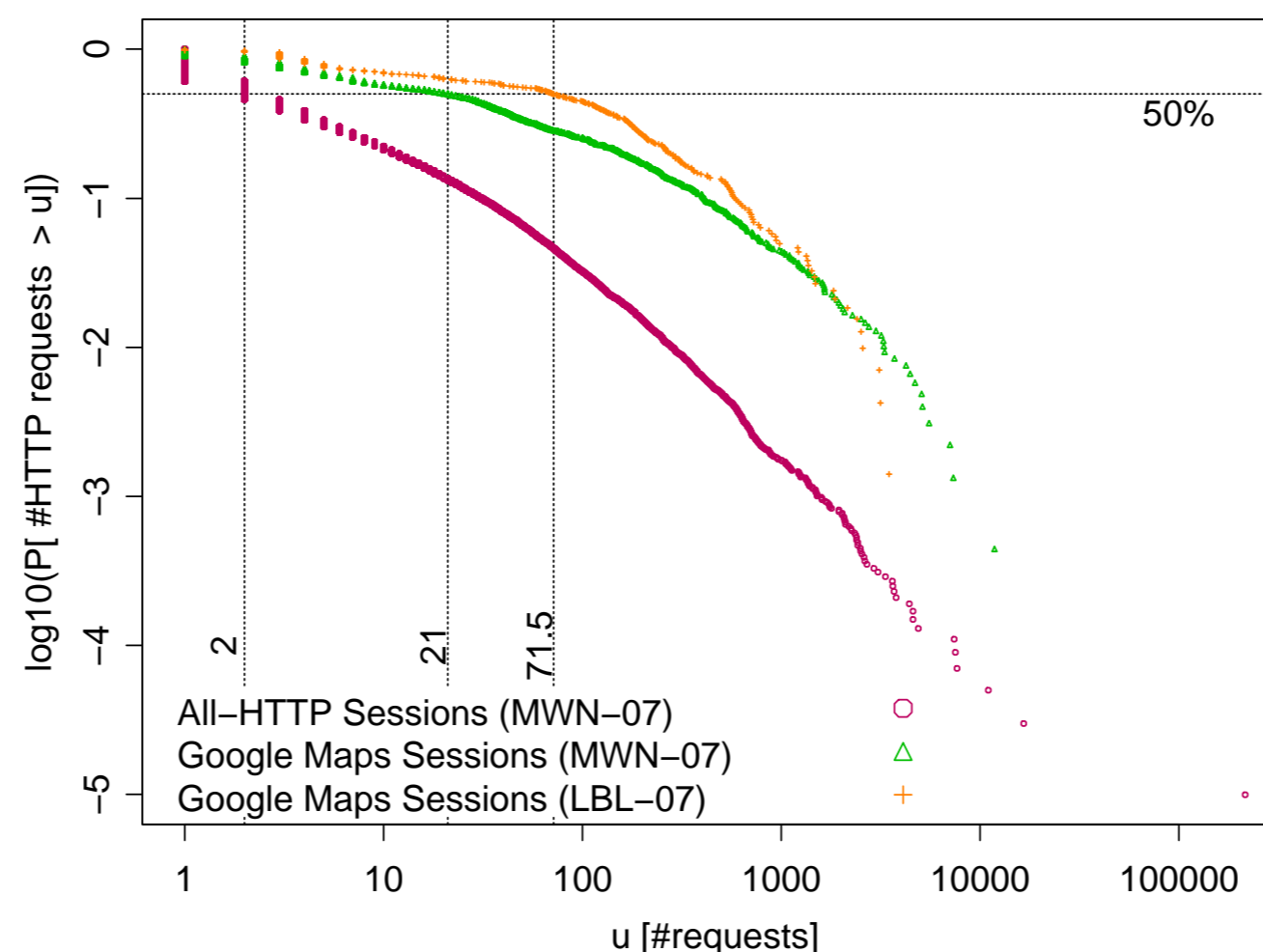
- Prefetching
- Multiple TCP conns to various servers
- Cookies to identify users
- Pipelined and persistent HTTP

RESULTS

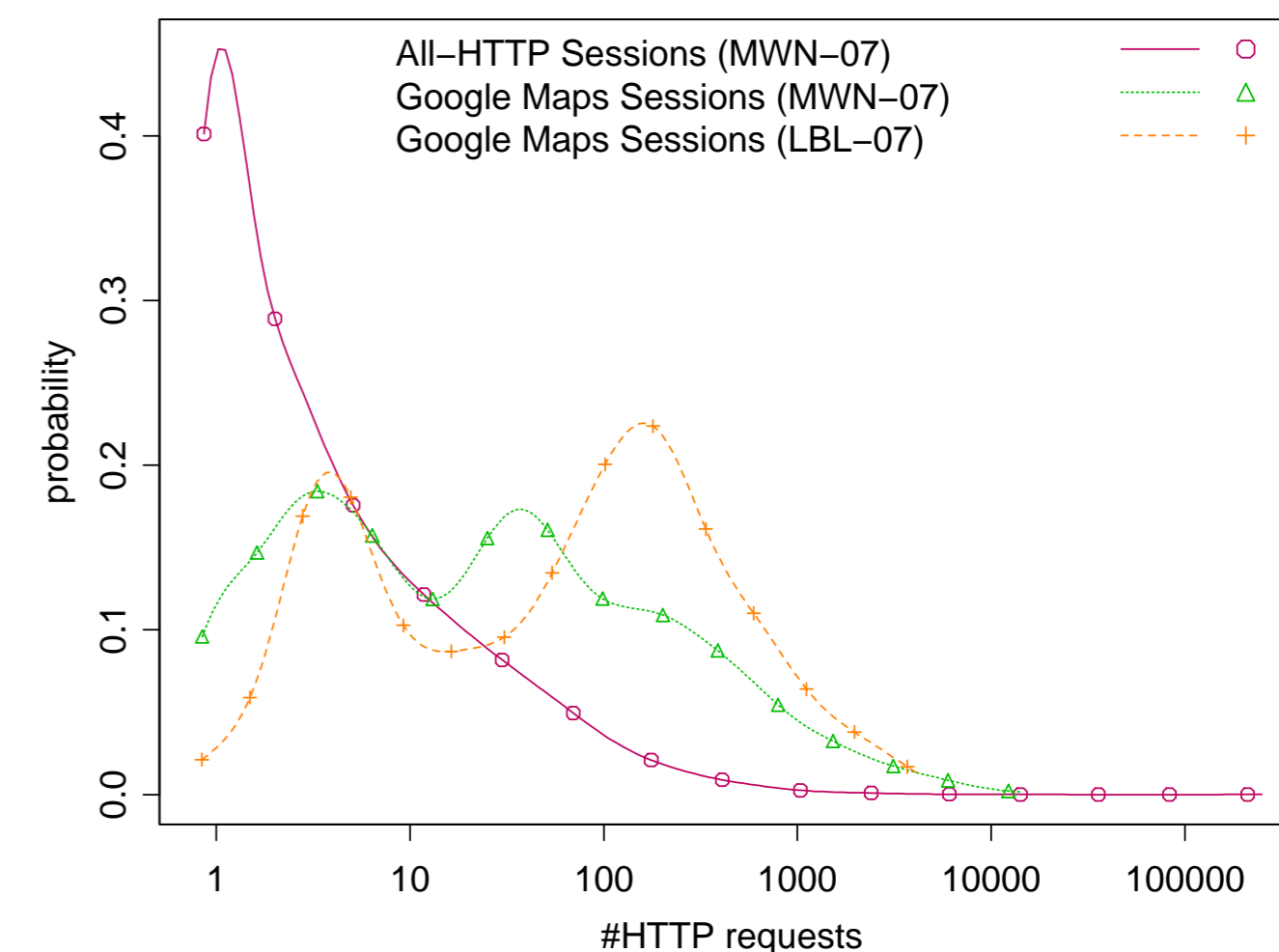
Bytes* per connection (CCDF)



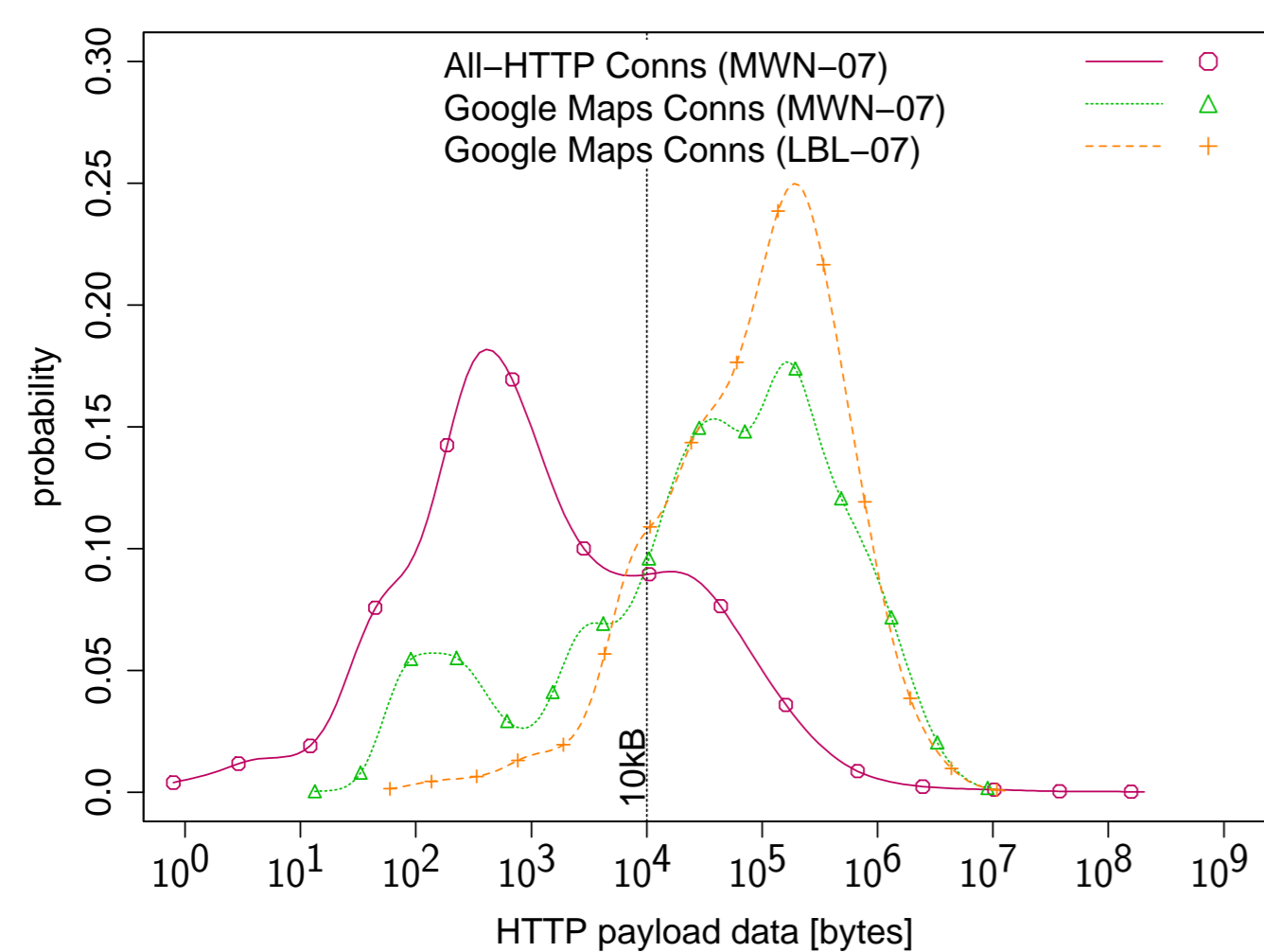
of requests per session (CCDF)



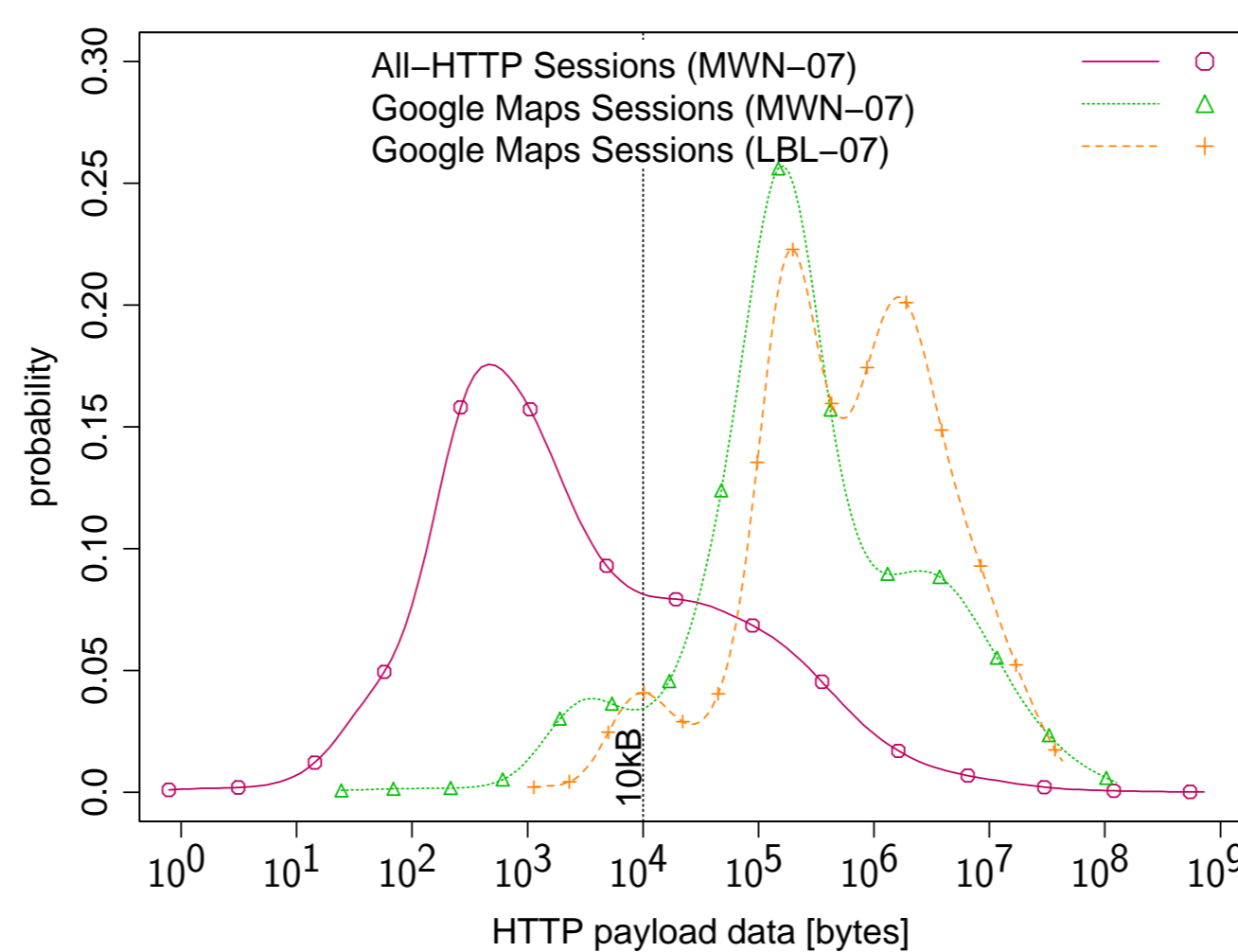
of requests per session (PDF)



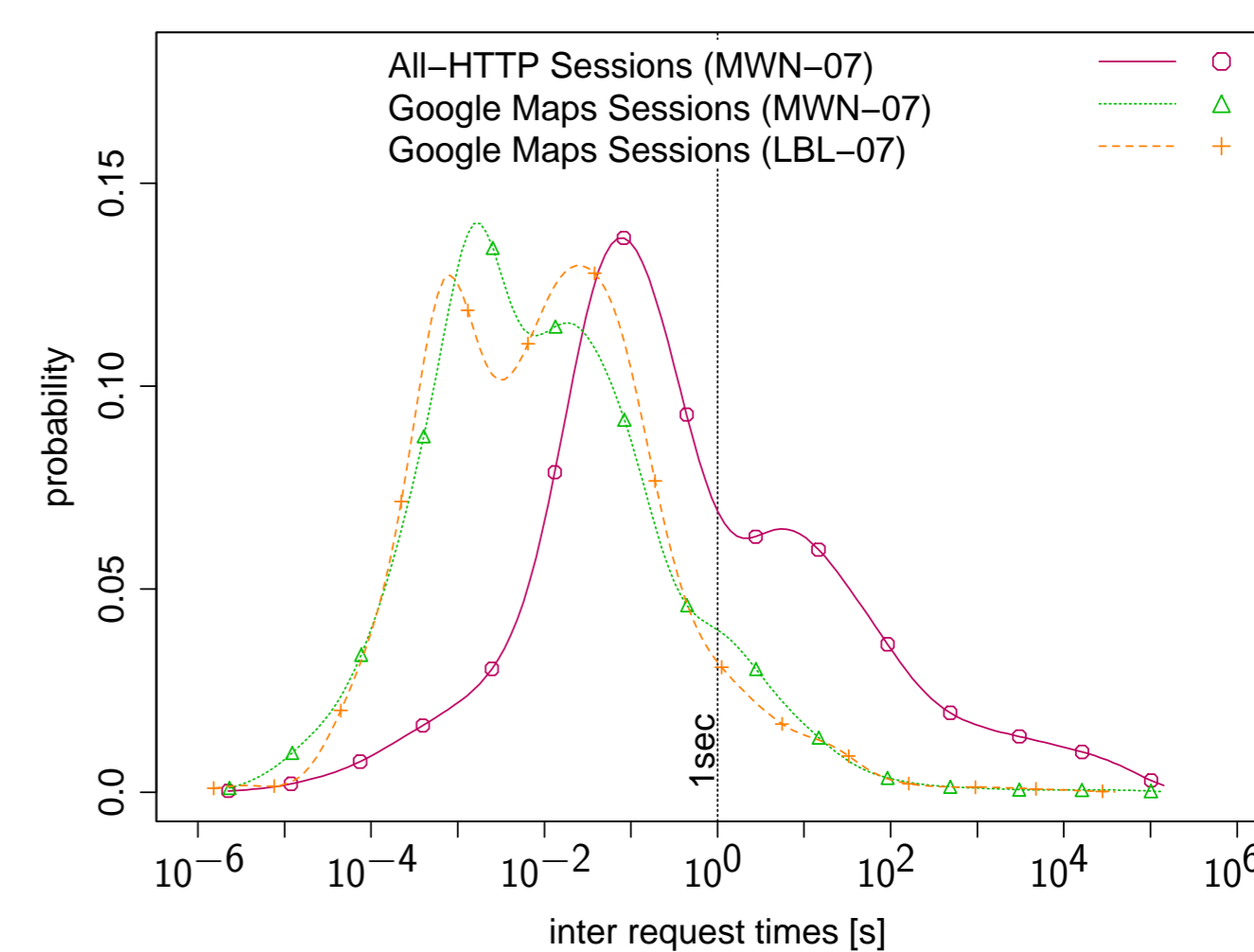
Bytes* per connection (PDF)



Bytes* per session (PDF)



Inter-Request-Times (PDF)



* HTTP Payload without headers

ANALYSIS APPROACH

- TCP stream reassembly and HTTP protocol analysis using *Bro*
- One-line summaries: for each HTTP request/reply pair,
- Google map traffic classification: filter with patterns from Table 1
- Session summaries:
 - Google map traffic: utilizing info in cookies
 - HTTP traffic: 3-tuple of Server IP/Port and Client IP

" / "
" /kh "
" /maps "
" /mt "
" /mapfiles "
" /mld "
" /mapstt "
" /intl "
" /favicon.ico "

Table 1: URL prefixes used in Google Maps requests.

FUTURE WORK

- Comparison with other Web map services
- Other AJAX application (e.g., Google Docs, Web mail services, ...)
- Longer analysis durations
- Study other features of Google Maps (such as: "Street View")