Cubicle vs. the Coffee Shop

Behavioral Modes in (Enterprise) End-Users

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Motivation

- Previous studies of user profiles used traces collected "in-network"
- Corporate networks today have 50-60% mobile hosts
- When profile is constructed in one environment, how different in another?
- Do profiles computed from "averaging" hold true in any of the environments?
- Is there a canonical user profile?
- What (statistics) change when users move?
- Should user profiles care about location?

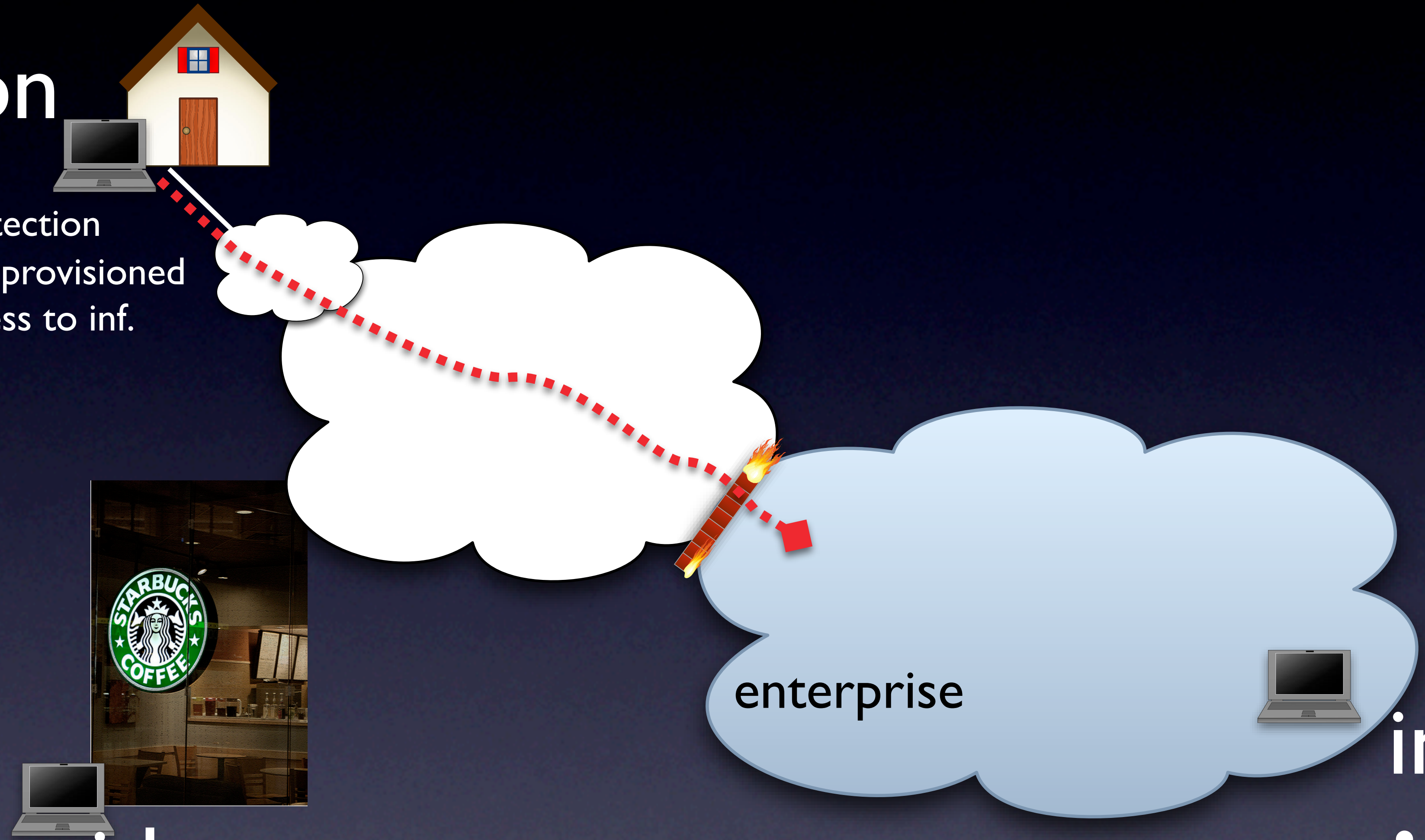
Data

- 350+ users, all running Windows XP SP2 custom build
- Collection software (windump+custom app) ran on laptops and (few) desktops
- Unique data-set (most traces collected in network)
- Traces collected for ~5 weeks; s/w automatically deactivated
- Traces periodically uploaded to central server

Recruiting users

- 1400+ people polled from across 3 business units
- Up front and clear statement about intended use
- Explicit consent-- software was installed by users
- Traces are uploaded anonymously; filenames do not identify individual users
- At central server: packets processed and payloads discarded
- Amazon gift certificates given out as enticement

Environments



vpn

- limited protection
- moderately provisioned
- limited access to inf. services

outside

- no protection
- badly provisioned
- no access to inf. services

enterprise

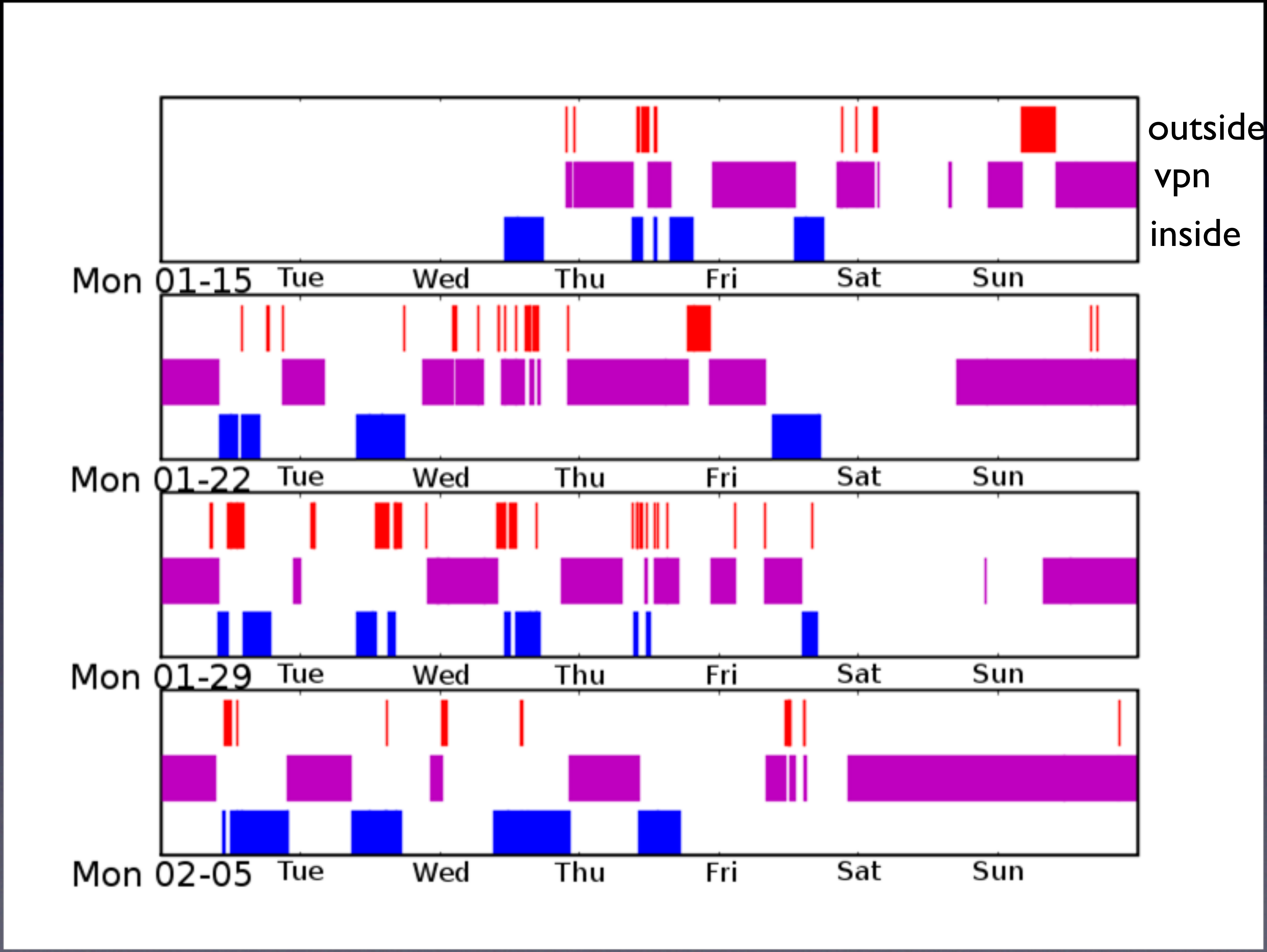
inside

- lots of protections
- well provisioned
- complete access to infrastructure services

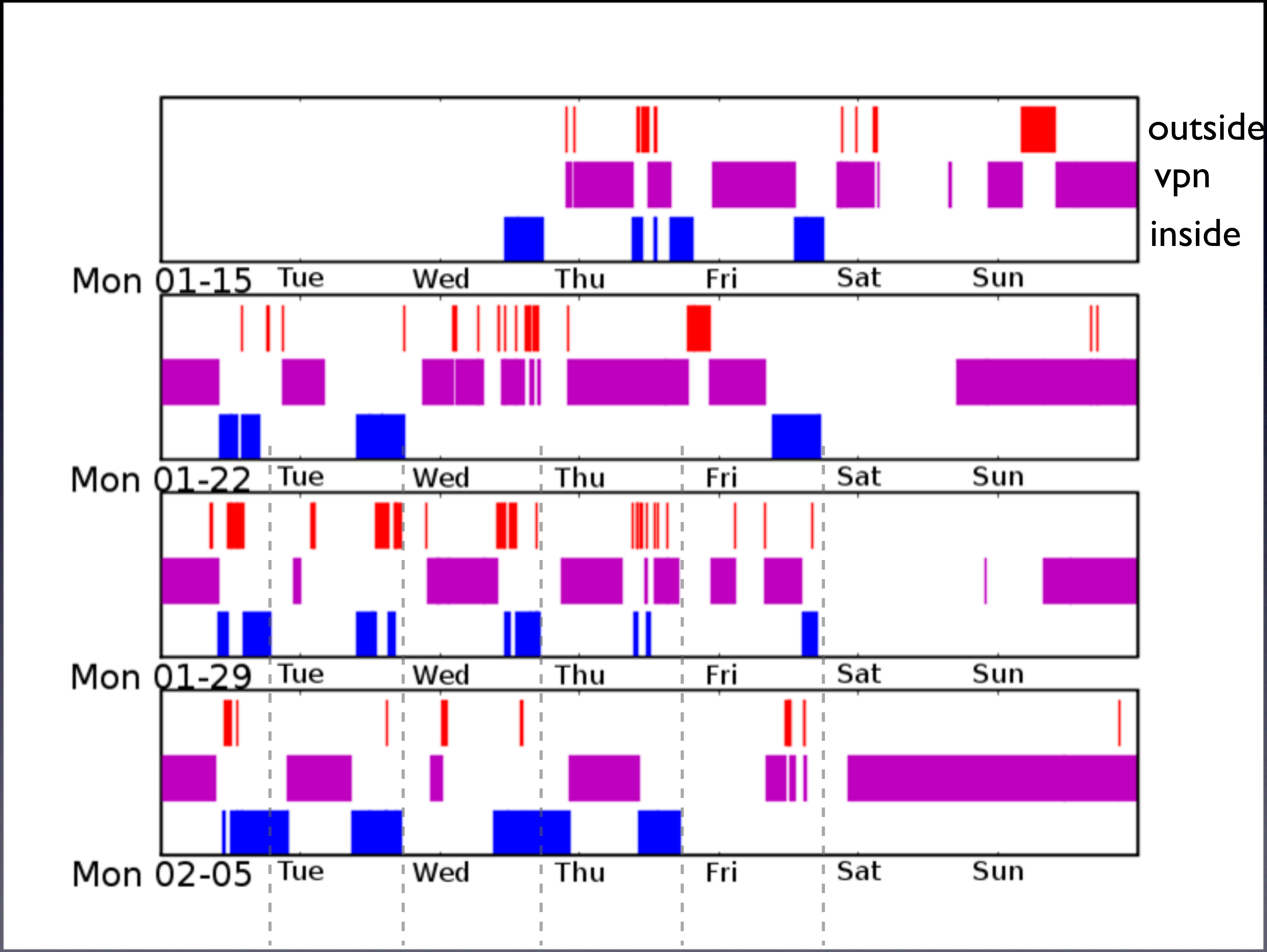
Questions

- How do users spend their time across environments
- Are there very big differences in protocol activity across the environments
- What are the differences in how various network services are used

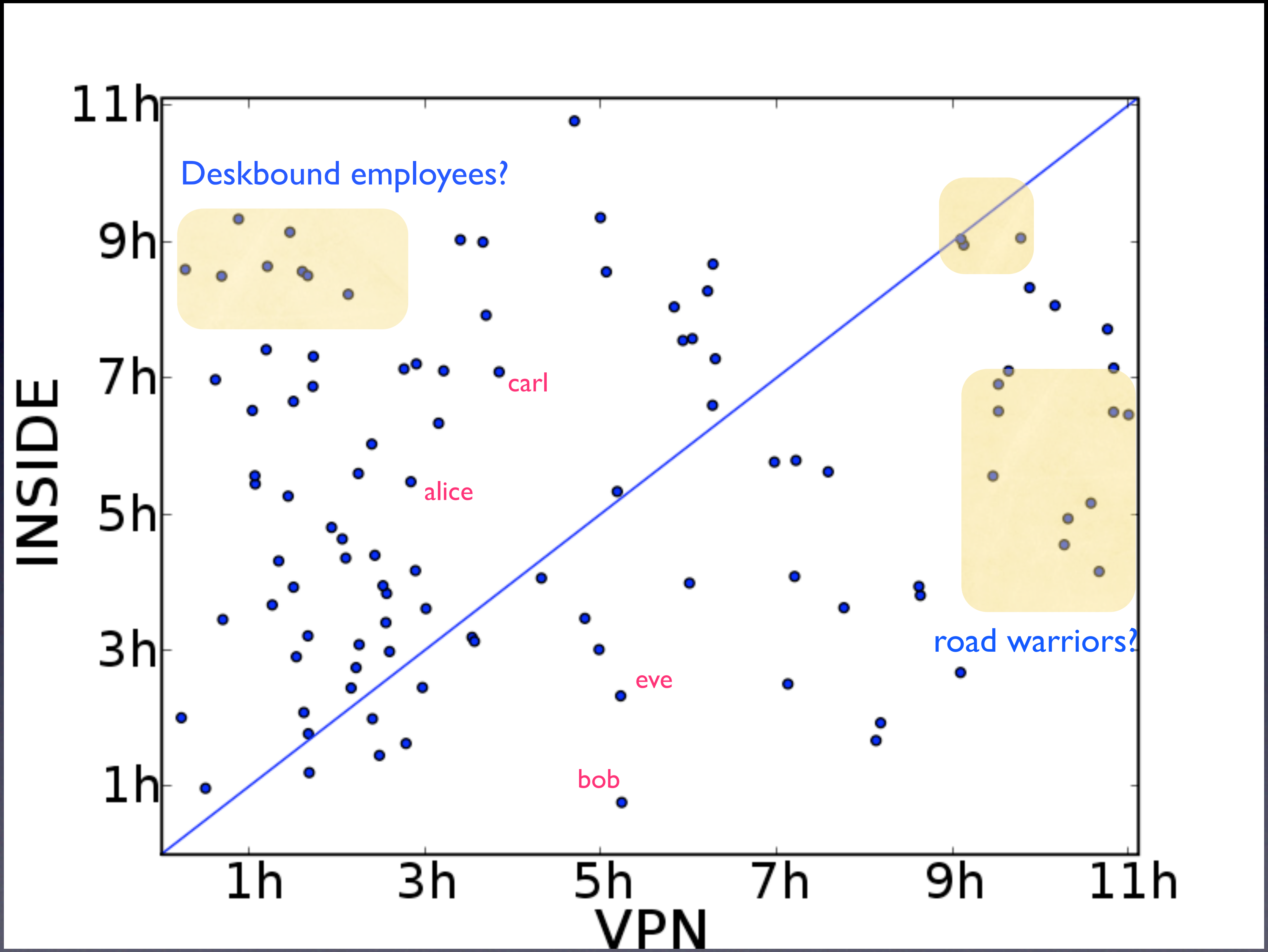
A month in the life of a laptop



A month in the life of a laptop



Environment Lifetimes



median time of “session”   (avg. diff =85%)

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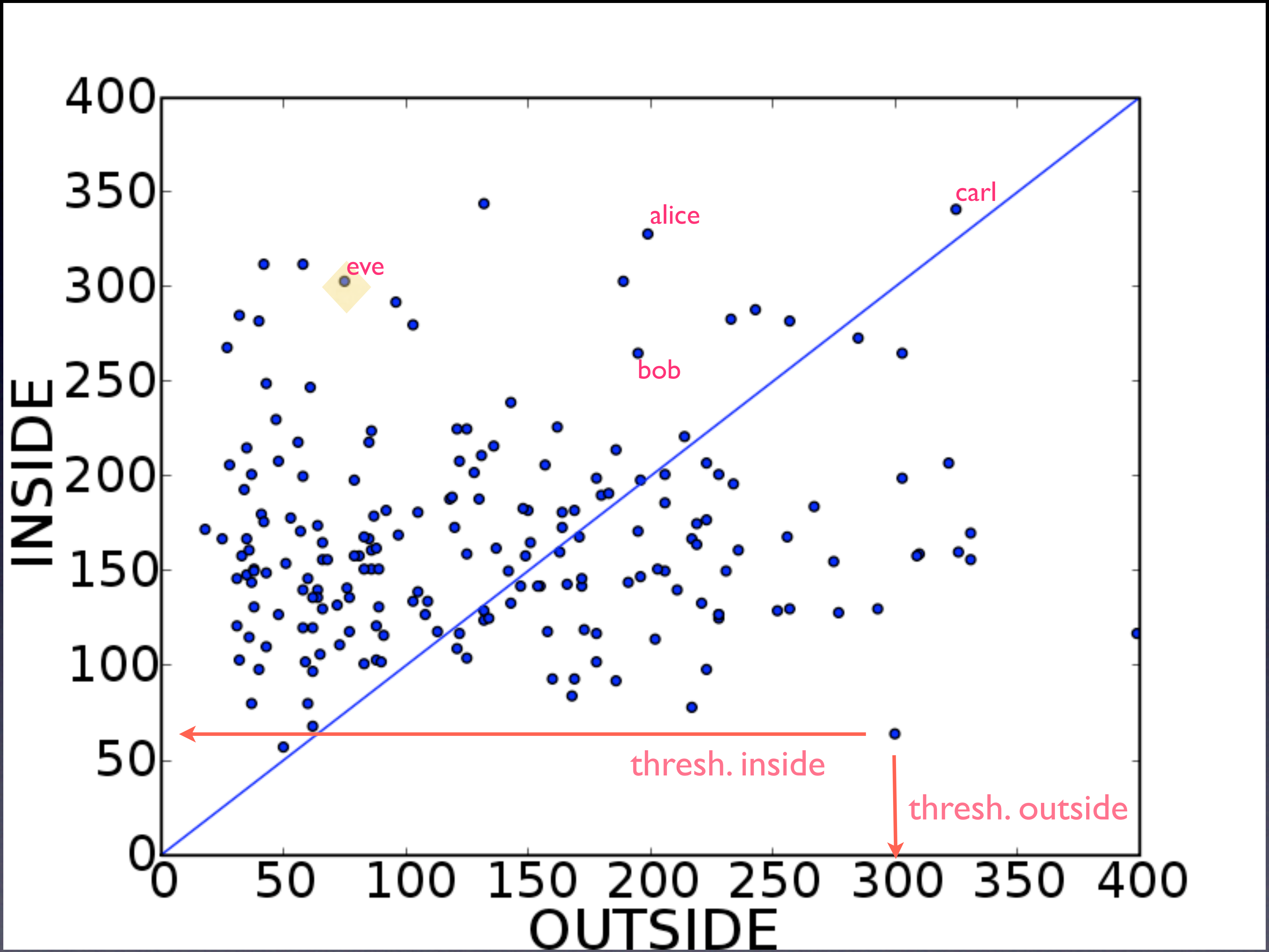
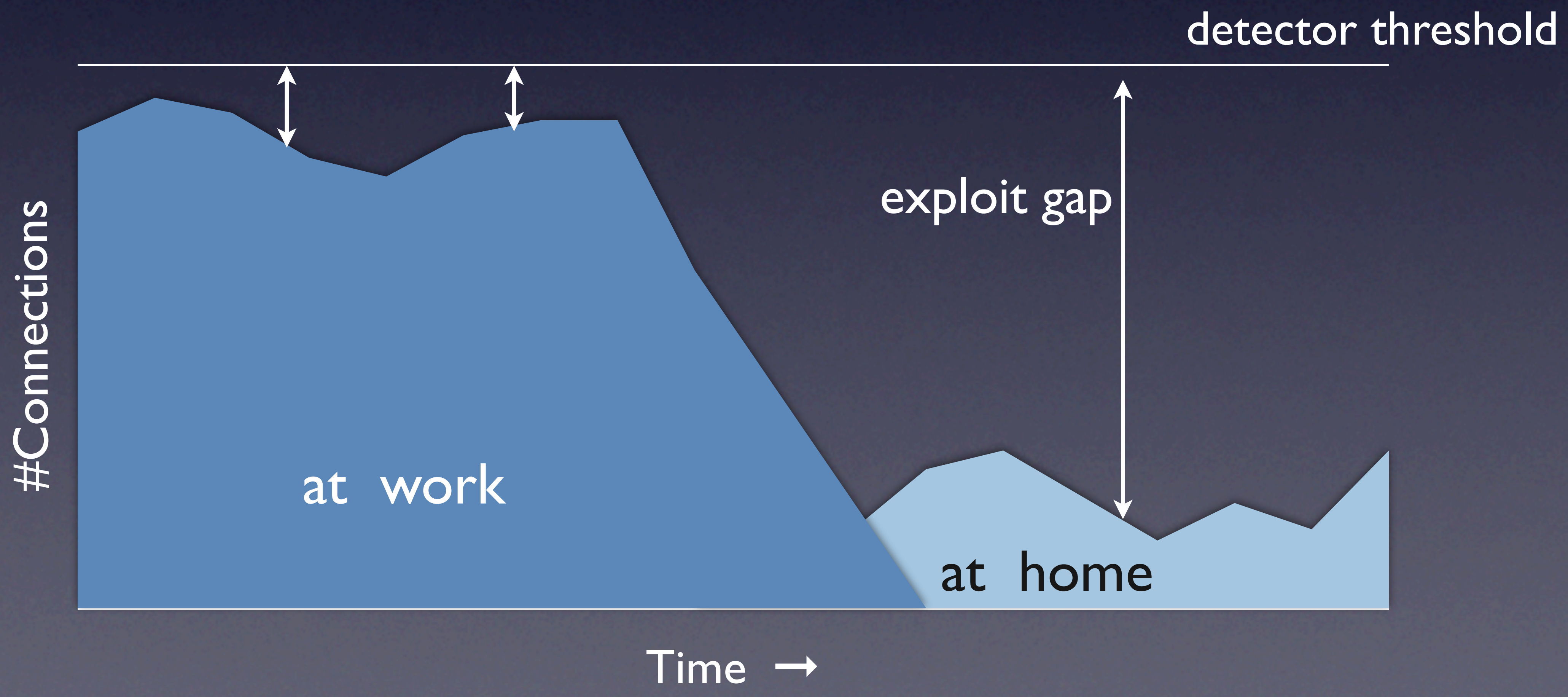
TCP usage (connections)



95th %-ile of connections/15 mins

Variation creates “exploit gap”

Current security mechanisms ➡ static thresholds ignore location context ➡ allow a larger operating region for malicious traffic to go undetected



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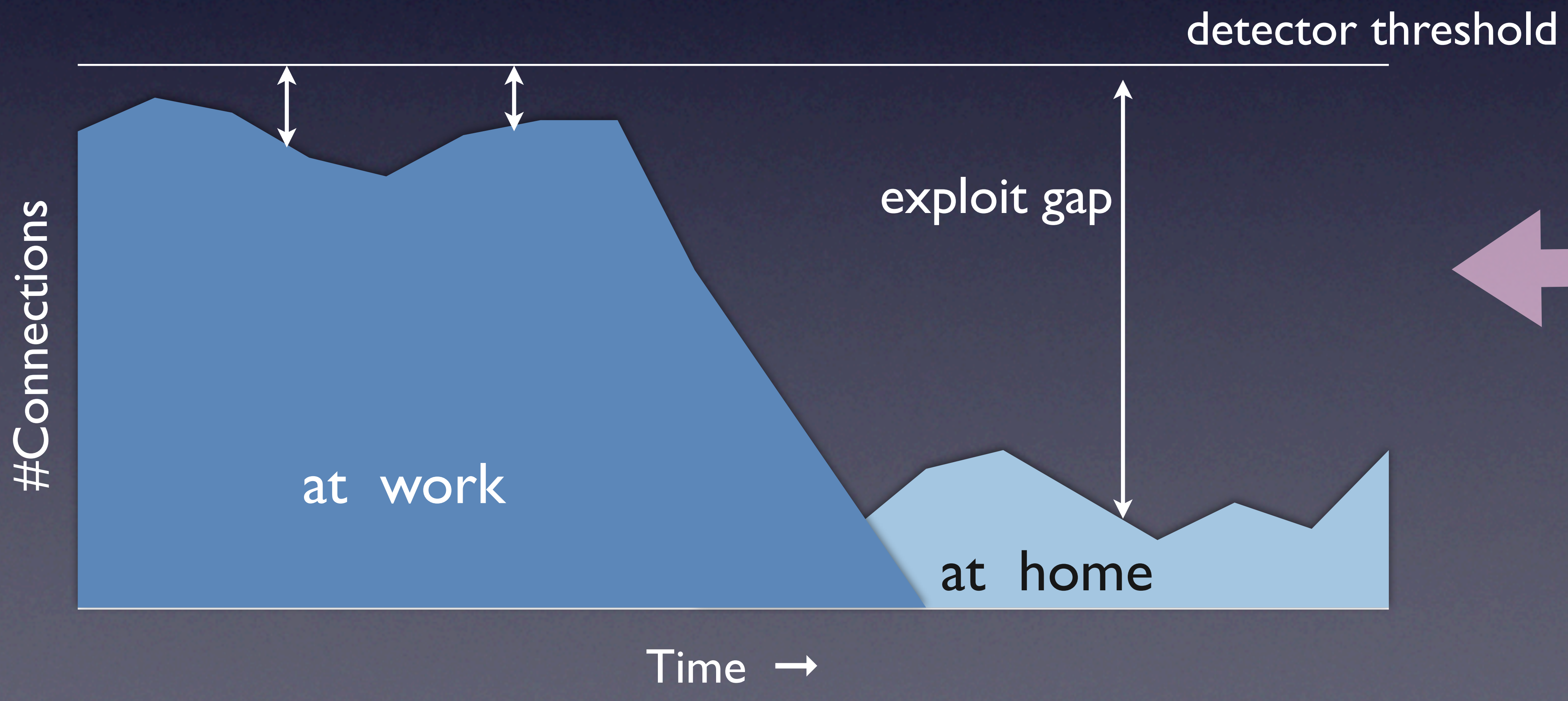

examples (conns/min)

Zapchast	(0–20)
SDbot C&C	(0–50)

Questions

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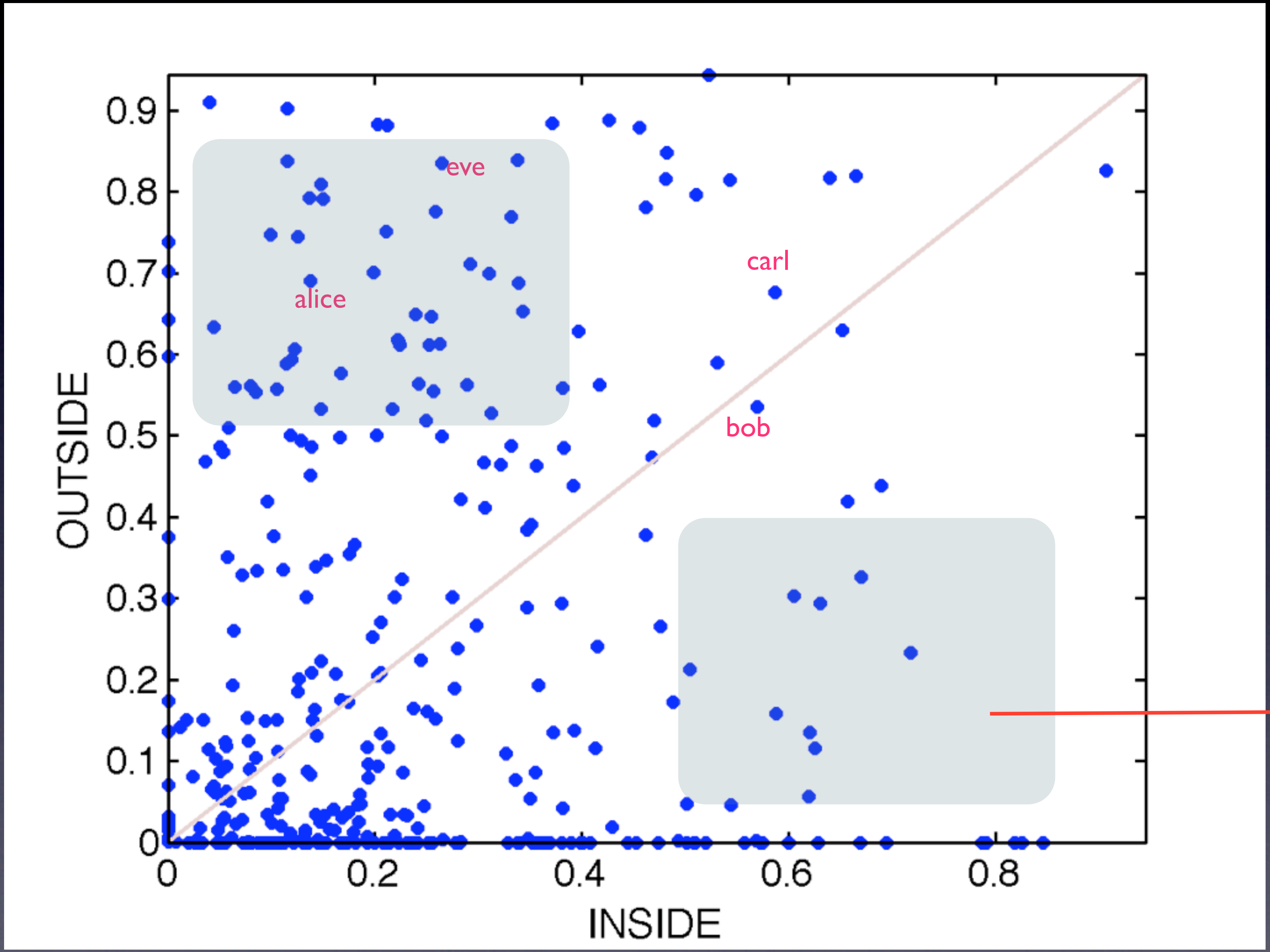
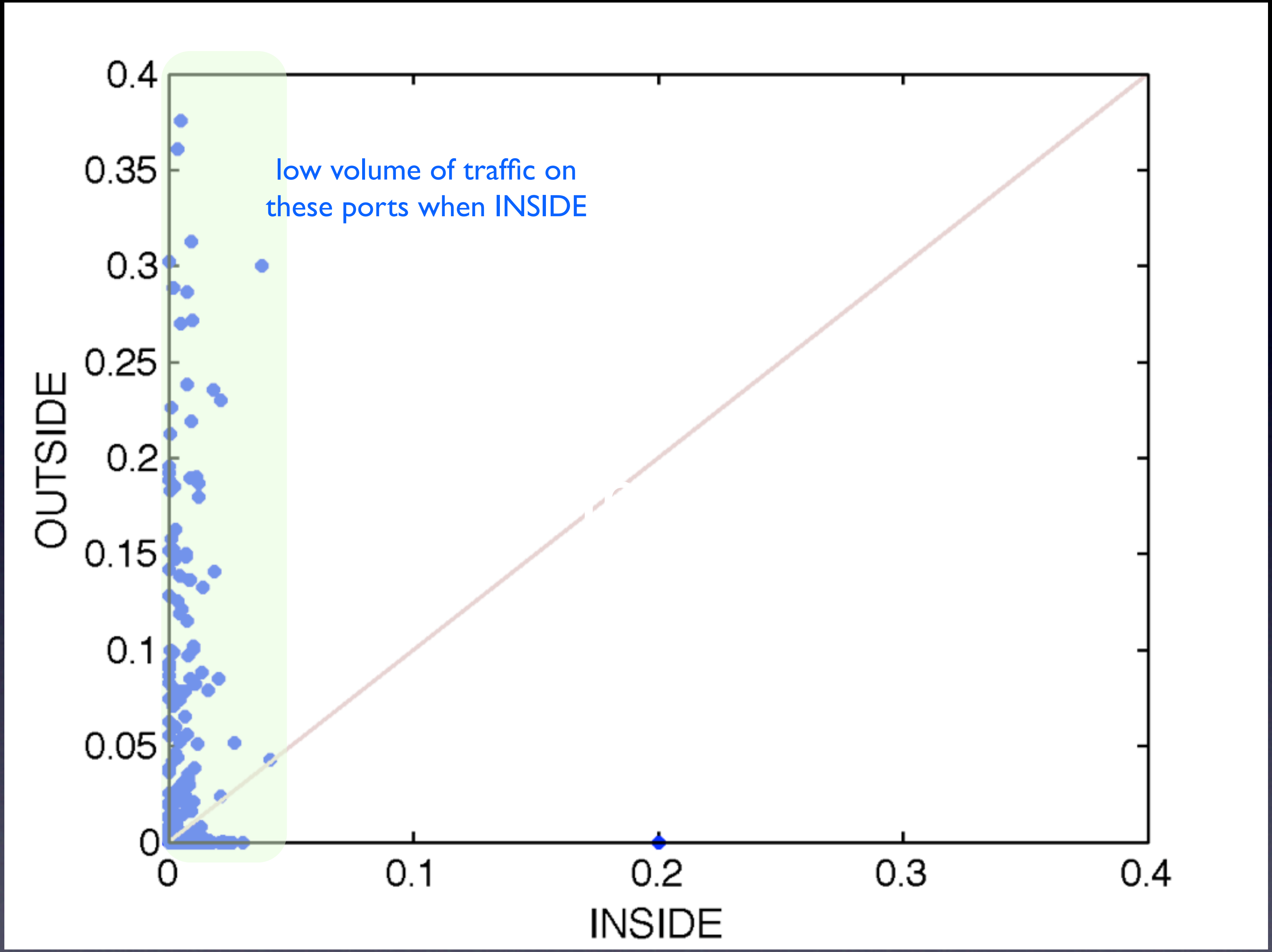
Network Services (ports)



relatively more http traffic when INSIDE

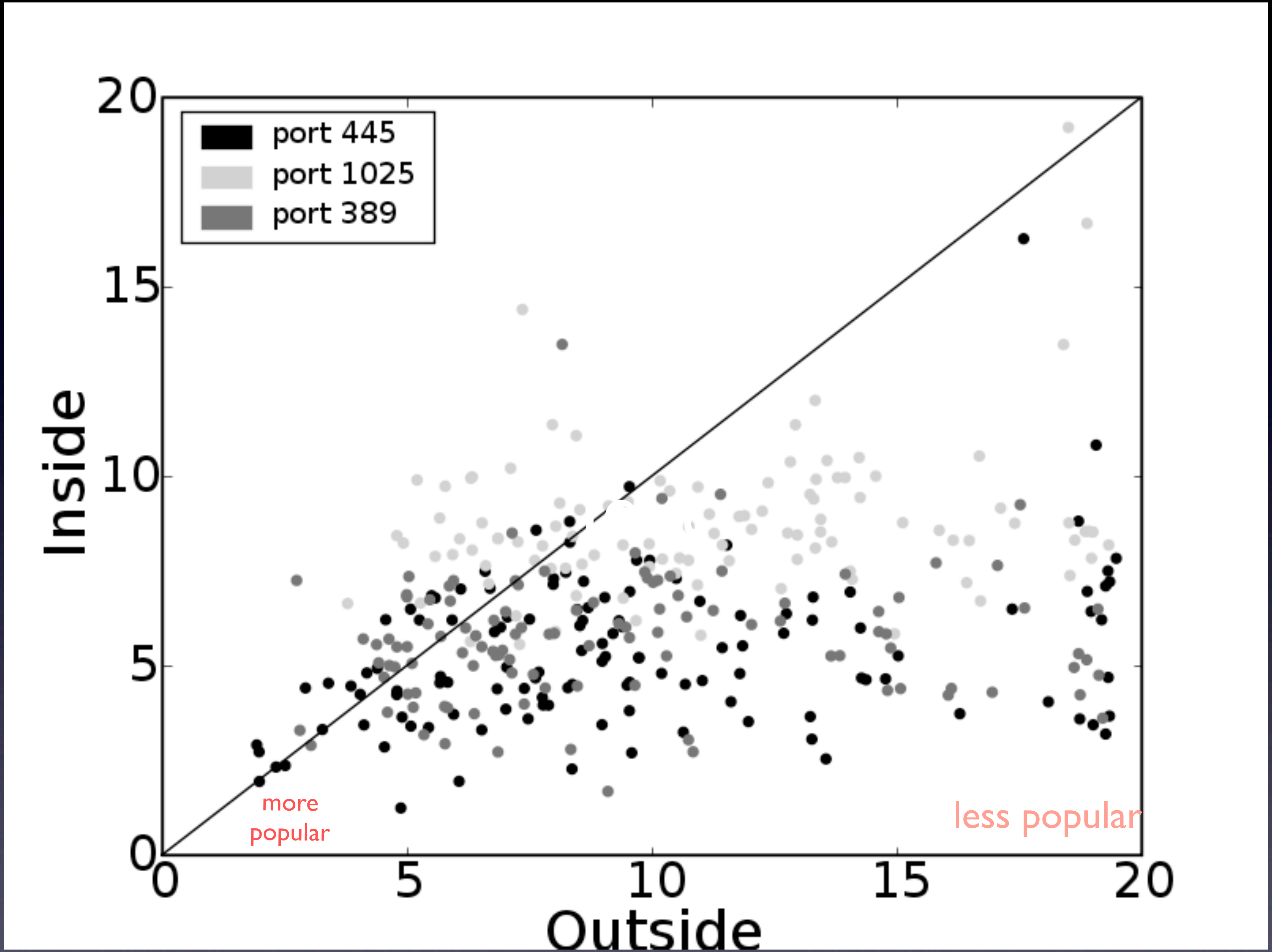
fraction of connections for web traffic (80,8080,8888)

Network Services (ports)



fraction of connections for Microsoft traffic

Network Services (ports)



a different view-- “popularity” of the protocols

Conclusions

- Behavior is drastically different across all the dimensions studied
- Profile constructed from averaged behavior not reflective of any particular environment
- No canonical user profile: users vary greatly from each other
- Security mechanisms need to be location aware to close “gaps” that can be exploited

Questions

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