

Can My Network Tell How I Feel?

Explainable Depression Indicators
from Network Traffic Metadata

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Bachelor project, Midterm Presentation | *Supervisor:* Prof. Dr. Bruno Rodrigues
School of Computer Science | 7 October 2026



Depressive **symptoms** are increasingly **common** and treatment often starts **too late**; the **network** sees every device **without** the user **interacting**

Why it matters

Depression is widespread

~10% of the Swiss report **depressive symptoms**.
For **15 to 34-year-olds**: roughly **1 in 6**.

Why help is difficult

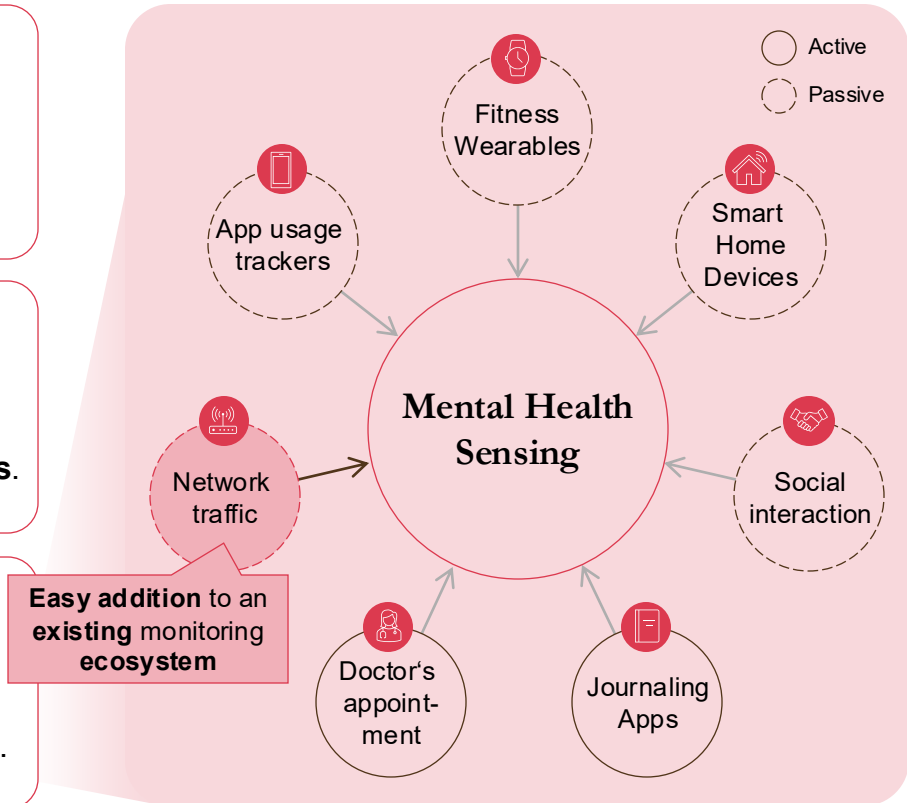
Treatment comes too late

Depression **develops gradually**.
The **delay** until **first treatment** ranges from **1 to 14 years**.

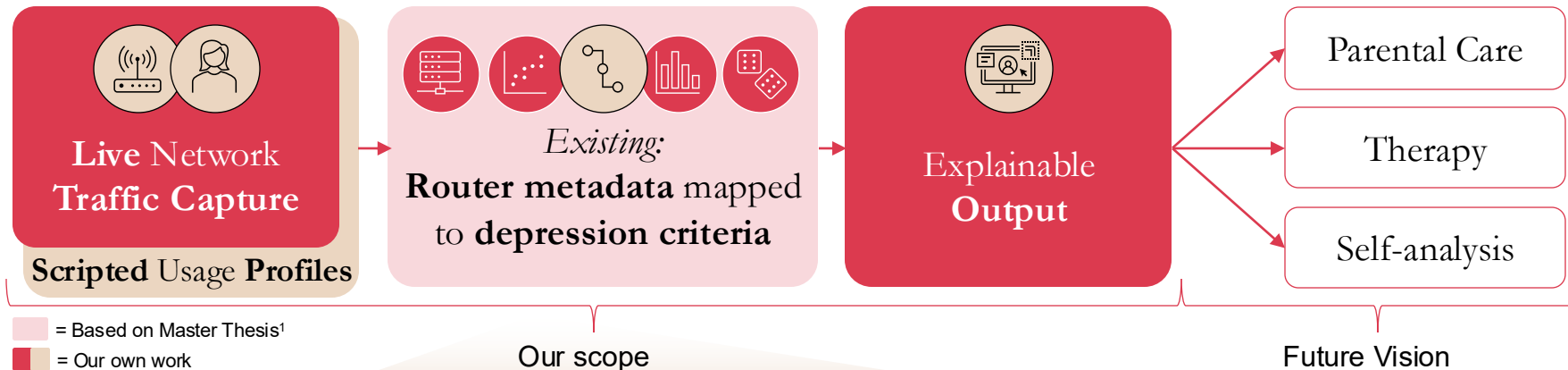
Why an addition is needed

Monitoring has blind spots

Active methods **burden** patients.
Passive ones are **tied** to a **device** or require **interaction**.



Our **goal** is to **expand** a **master thesis** that already maps network traffic to depression criteria by bringing it to **live traffic** and making results **traceable**



Our Goal: The pipeline that maps traffic to depression criteria:



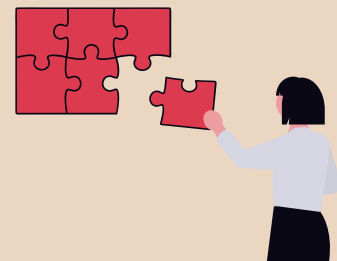
runs on local **live-traffic**



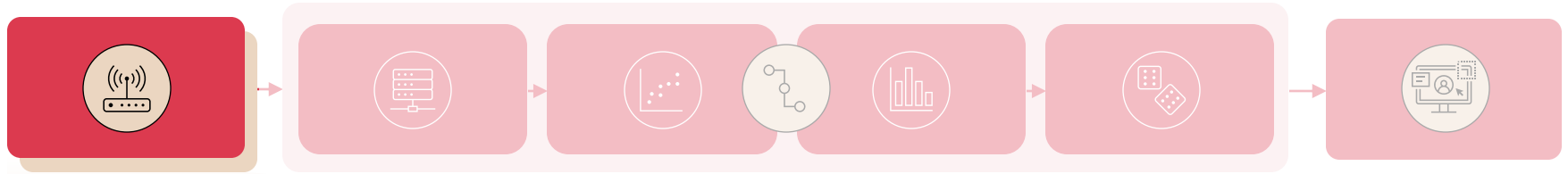
detects scripted behavioral **pattern profiles**



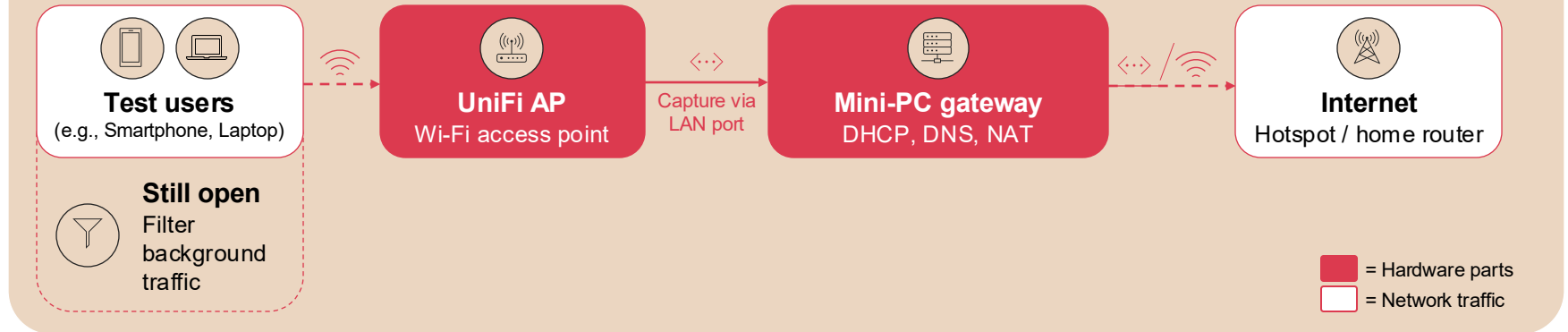
allows each **likelihood** to be **traced back** to the **raw packets**



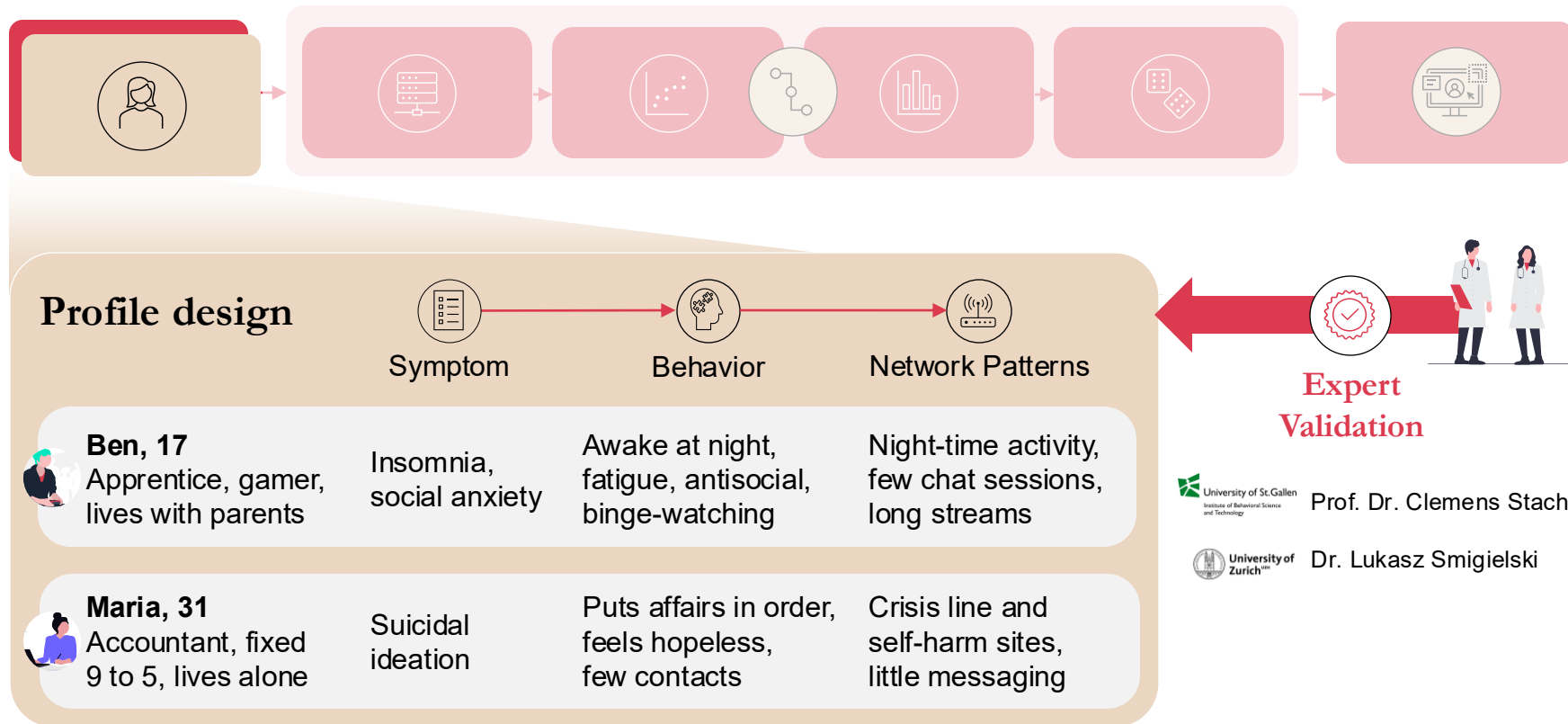
Deep Dive: All **traffic** from the test devices is **captured** on a **mini-PC** acting as the network **gateway**; contents stay encrypted and only **metadata** is used



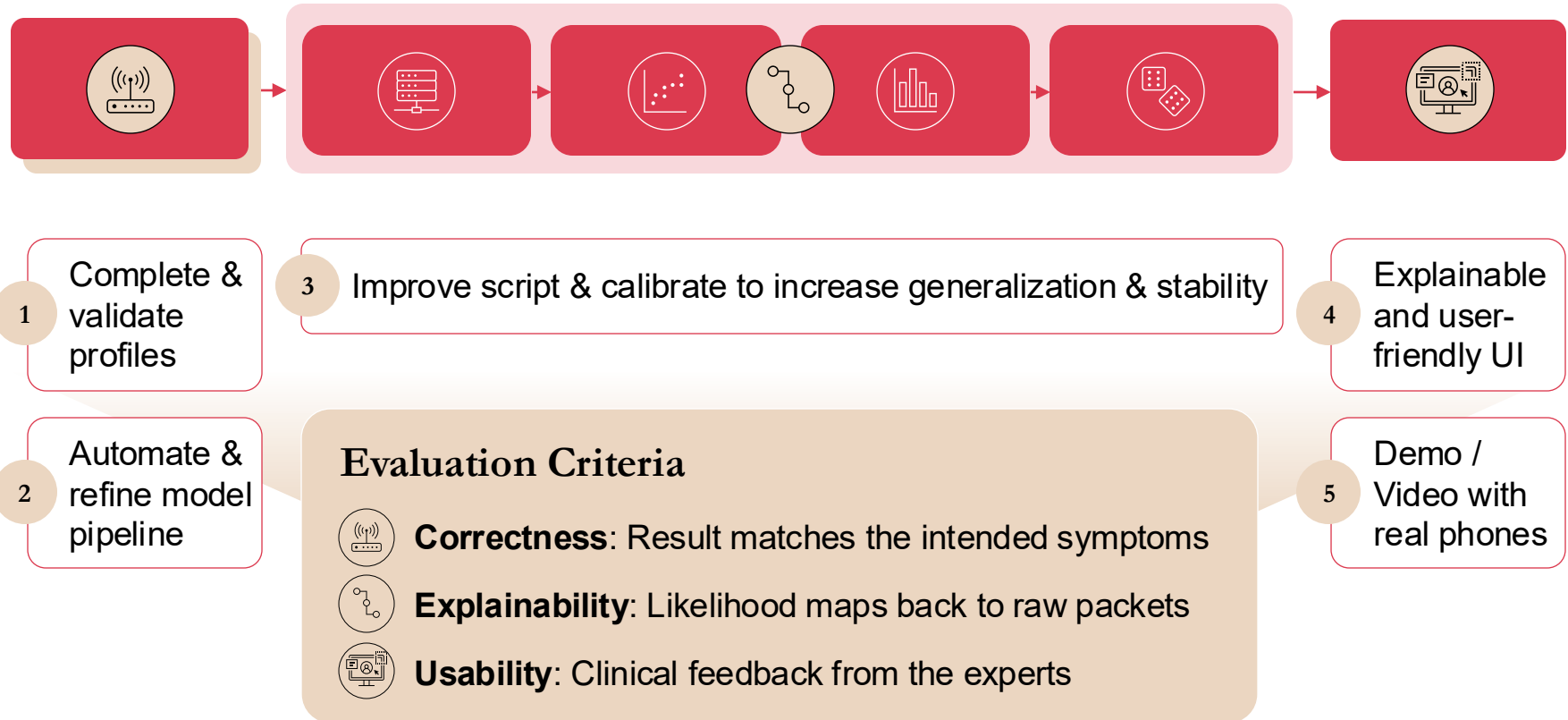
Technical Setup



Deep Dive: **Profiles** link a **depression subtype** to everyday **behavior** and to the **patterns visible** in the **network**; **experts** stay in the loop to validate



Next up: **Finalize** the profiles, **automate** the pipeline and **evaluate** whether it recognizes the scripted behavior; then build a **demo** with clinical feedback

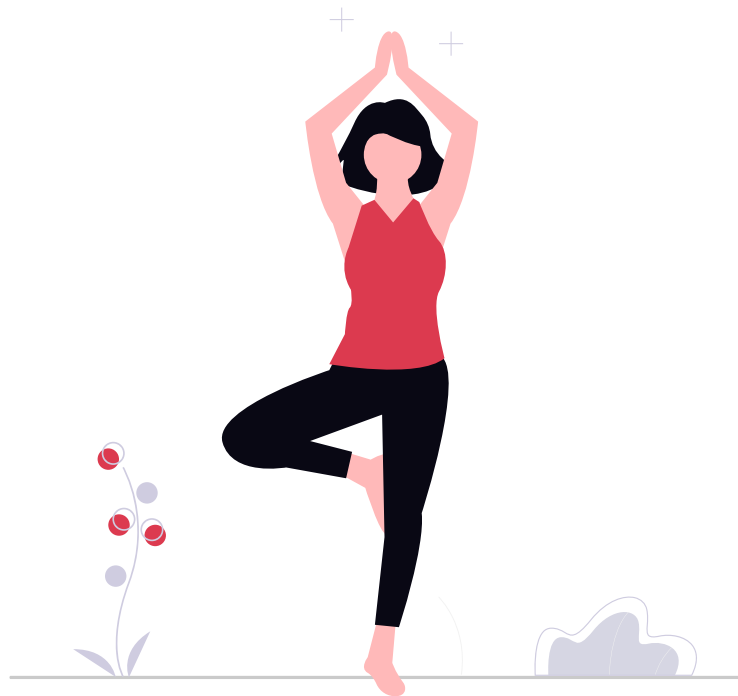


How Do *You* Feel?

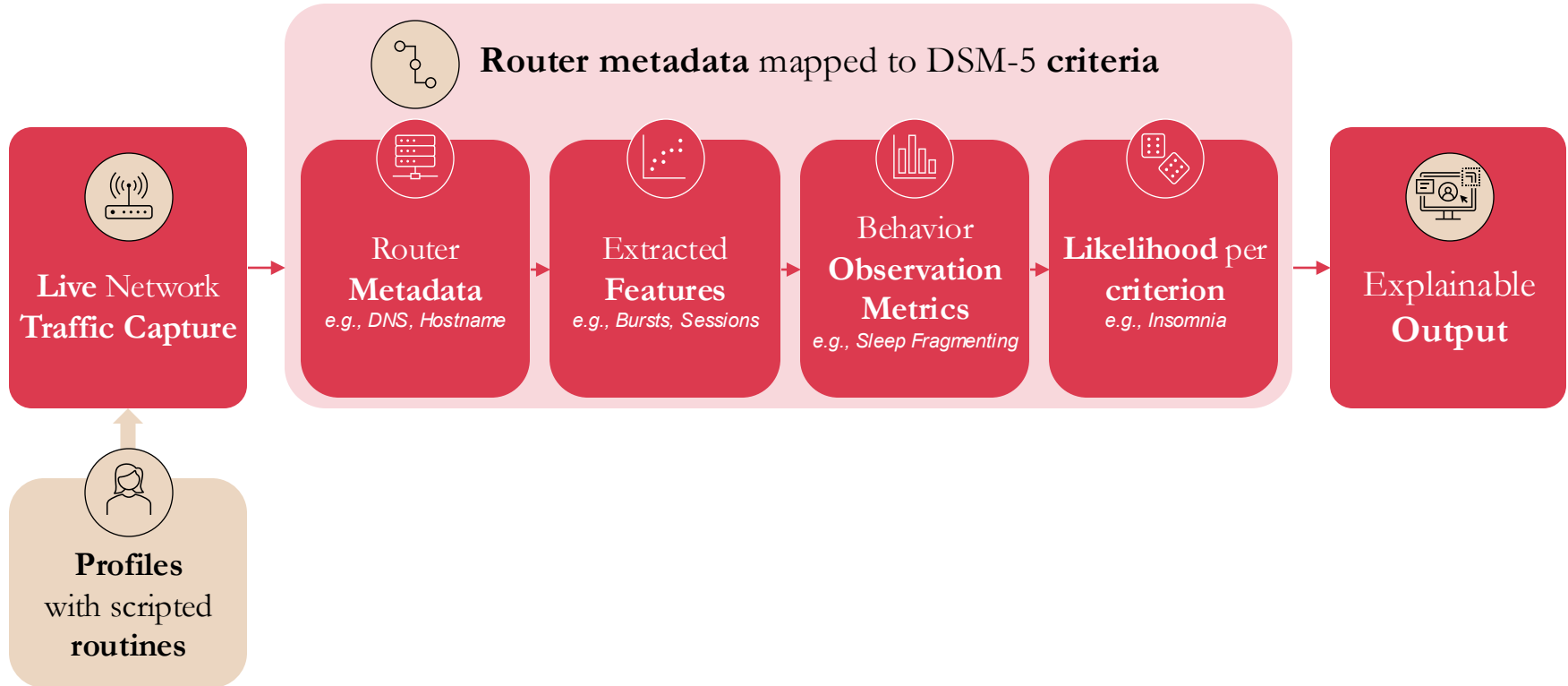
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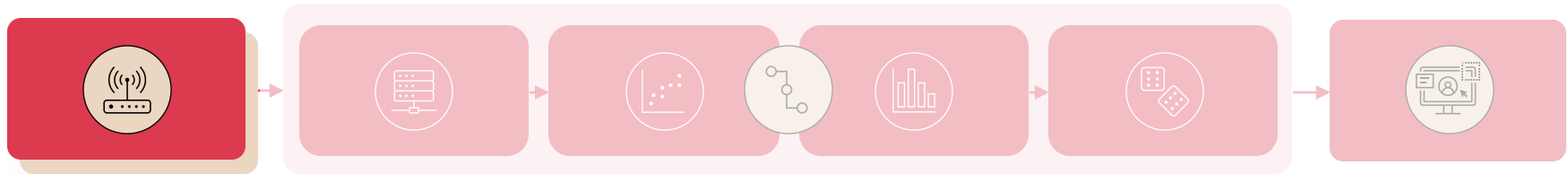
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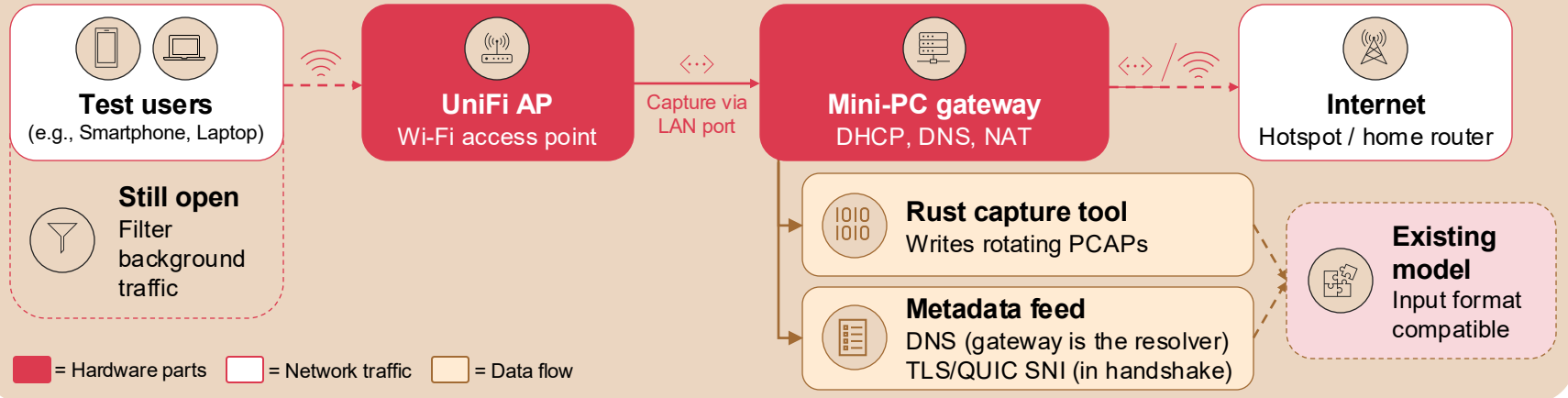
Overall Framework



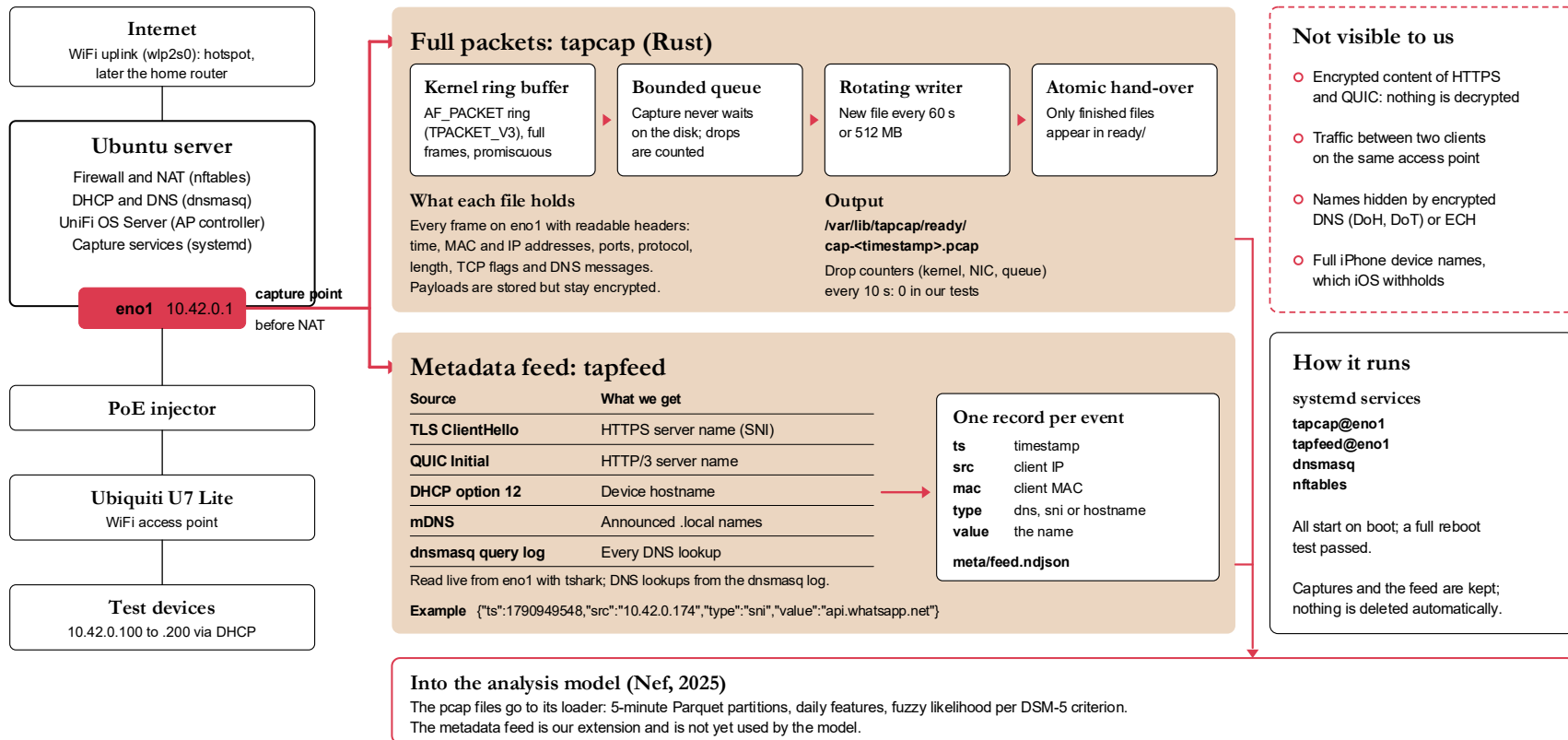
Approach Details: Live Network Traffic Capturing



Setup



Technical Details: Live Network Traffic Capturing



Collected Information from Network Traffic

In every packet (pcap files)

Used by the analysis model

Collected

Stored, but encrypted

Capture record

pcap header

Timestamp (µs)

Original length

Captured length

Ethernet

link layer

Source MAC

Destination MAC

EtherType

IP

IPv4 and IPv6

Source IP

Destination IP

Protocol

Packet length

TTL / hop limit

TCP and UDP

transport layer

Source port

Destination port

TCP flags

Sequence and ack numbers

Window size

Readable metadata

sent in clear text

DNS queries and answers

TLS ClientHello: SNI, version, ALPN

QUIC Initial: SNI

Server certificate (TLS 1.2 only)

DHCP: hostname, vendor class

mDNS names

Payload

content

HTTPS and QUIC: stored, never decrypted

Plaintext protocols (e.g. HTTP, NTP): readable

Metadata feed (feed.ndjson)

ts

src

mac

type

value

type	value	comes with
dns	domain looked up	client IP
sni	server name (TLS, QUIC)	client IP, MAC
hostname	device name (DHCP, mDNS)	client IP, MAC

Kept on the server

DHCP leases

MAC

IP

Hostname

Lease expiry

DNS query log (dnsmasq)

Time

Query name

Record type

Client IP

Answer IPs

What the model derives from these fields (examples)

Timestamps: activity per minute, night/day ratio, longest inactivity, sleep onset and wake-up time.

Lengths and IP direction: upload and download bytes. Sessions: 5-minute idle rule.

DNS names reduced to domains: unique sites per day, social, streaming and productivity hits.

Not collected

Content of encrypted traffic; data on the devices (apps, screen, location, keystrokes); traffic between clients on the same AP; names hidden by DoH or ECH.