A Brief Intro on

PKTLAB
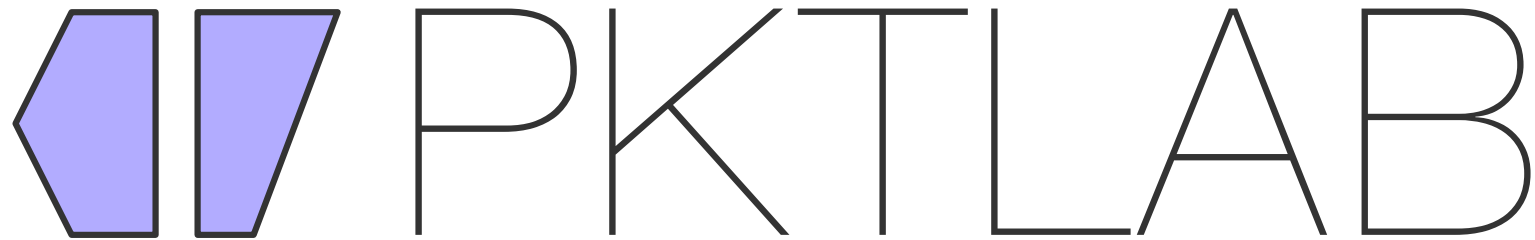
A Universal Measurement Endpoint Interface

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Obstacles of Vantage Point Sharing

- **Compatibility** – Need to port experiments across platforms

- **Incentives** – Supporting diverse experiments at vantage point can be costly

- **Trust** – Operator need to trust experimenters, or audit the experiments
  - Audit cost?

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Solution:

PacketLab Overview – Common Interface

- Idea: have vantage points act as **enhanced VPN servers**
  - Service: network traffic forwarding with **scheduled send** and **event timestamps**
  - Primitives: BSD-socket-like operations (building blocks!)
    - Support TCP, UDP, Raw (IP traffic)
- Helps with compatibility and incentives

```
- nopen(sktid,proto,rbufsz,locaddr,…)
```
   Open a socket on the endpoint with given protocol family, protocol (UDP/TCP …), and additional parameters.

```
- nsend(sktid,proto,sndtime,tag,…,data)
```
   Schedule to send data out of opened socket at specific time. "**tag**" is used to propagate result back to controller.

```
- nclose(sktid)
```
   Close a socket on the endpoint.

PacketLab Overview – Security

- **Certificates**
  - Privilege provisioning
- **Predefined and program-defined policies/restrictions**
  - Mostly by vantage point operators
  - Predefined: measurement run time, experiment priority, etc.
  - Filters: eBPF programs on traffic
  - Monitors: ?? programs on protocol messages (ongoing)
  - Certificate-wise, regardless of experiment program
- Helps with trust (also, no need for auditing new experiment programs!)

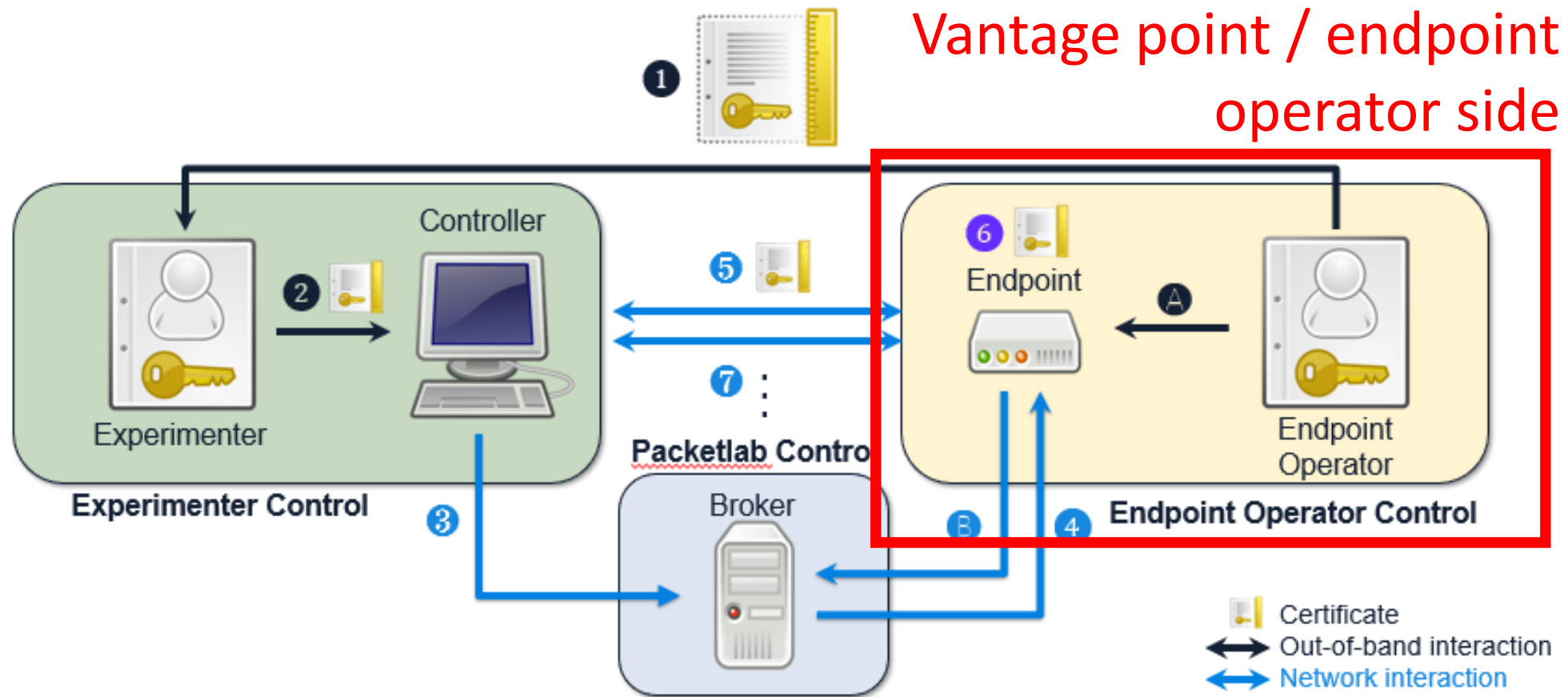# The PacketLab Architecture (IMC'22 Poster)
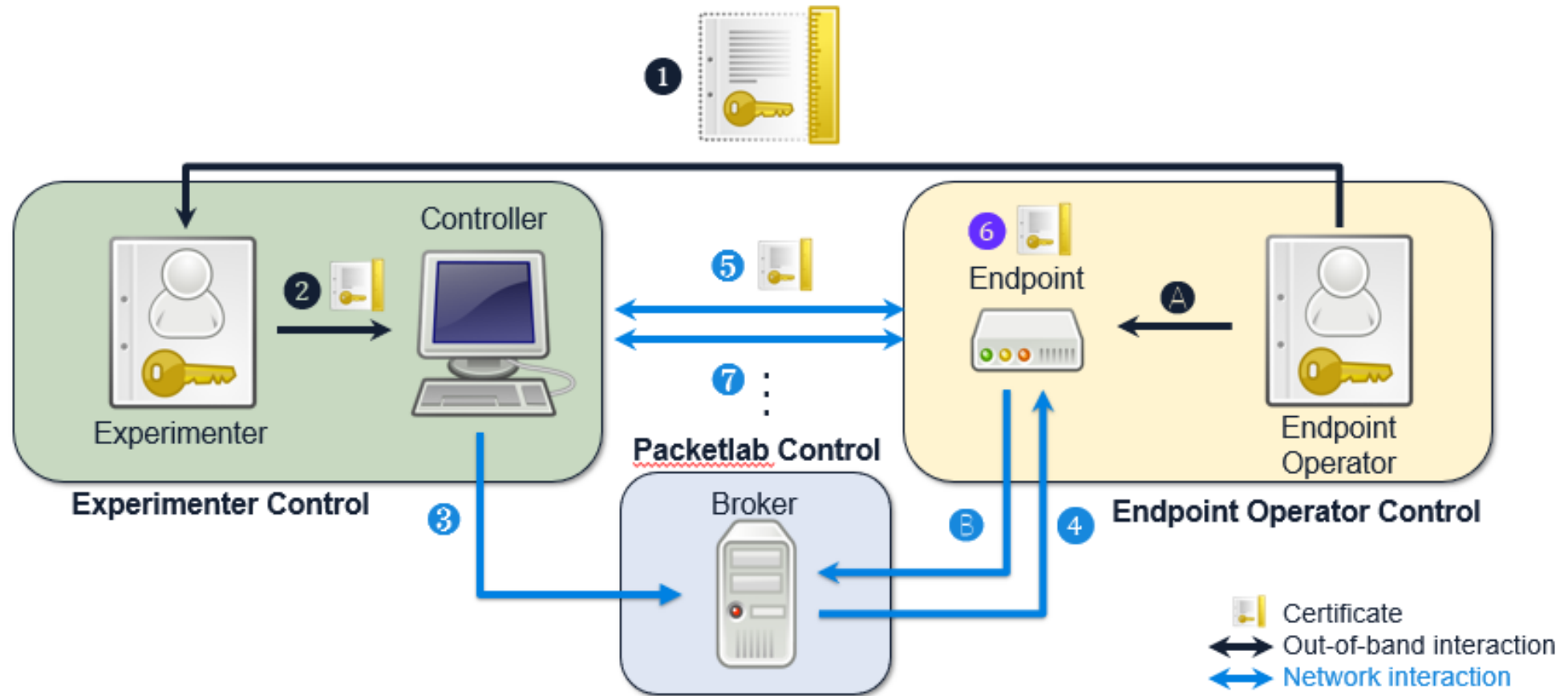
The PacketLab Architecture (IMC'22 Poster)

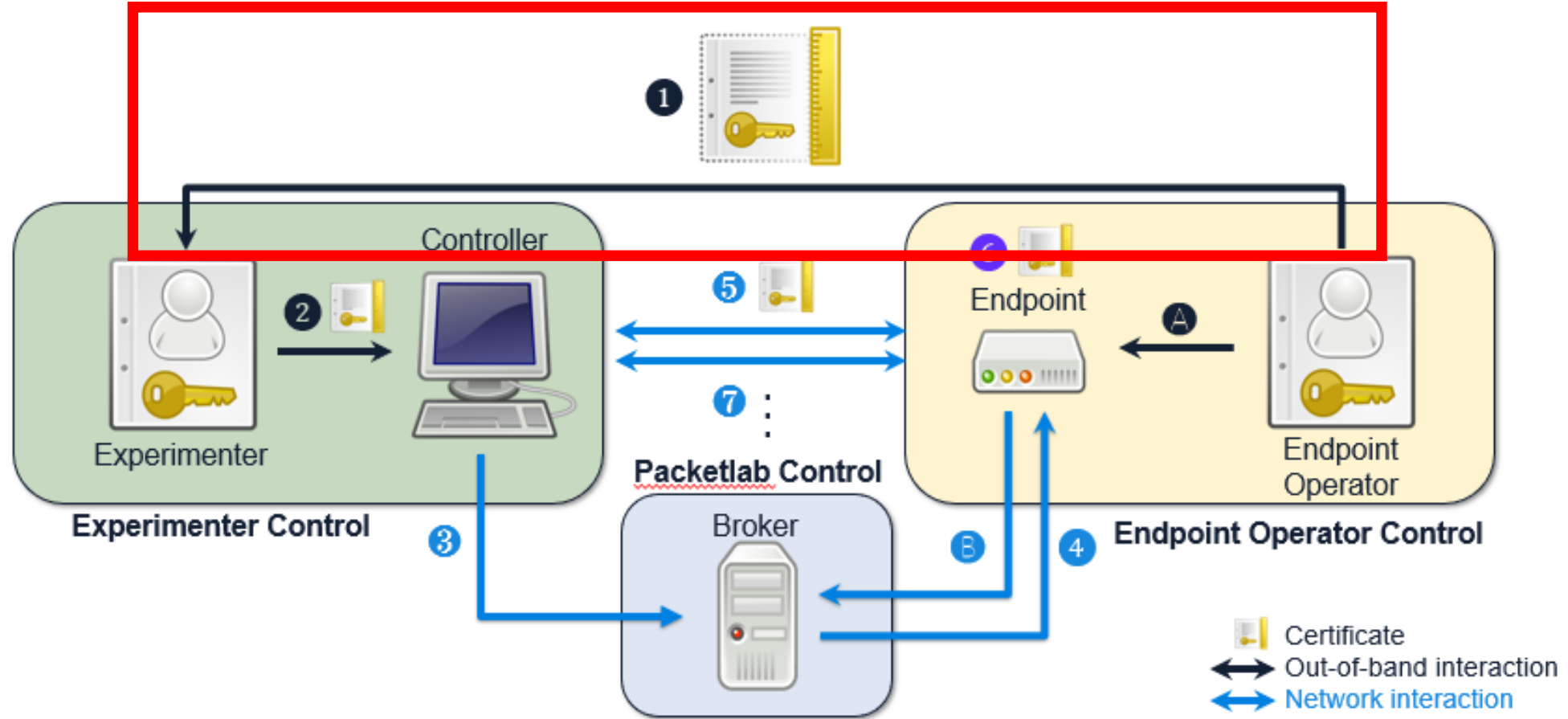# The PacketLab Architecture (IMC'22 Poster)
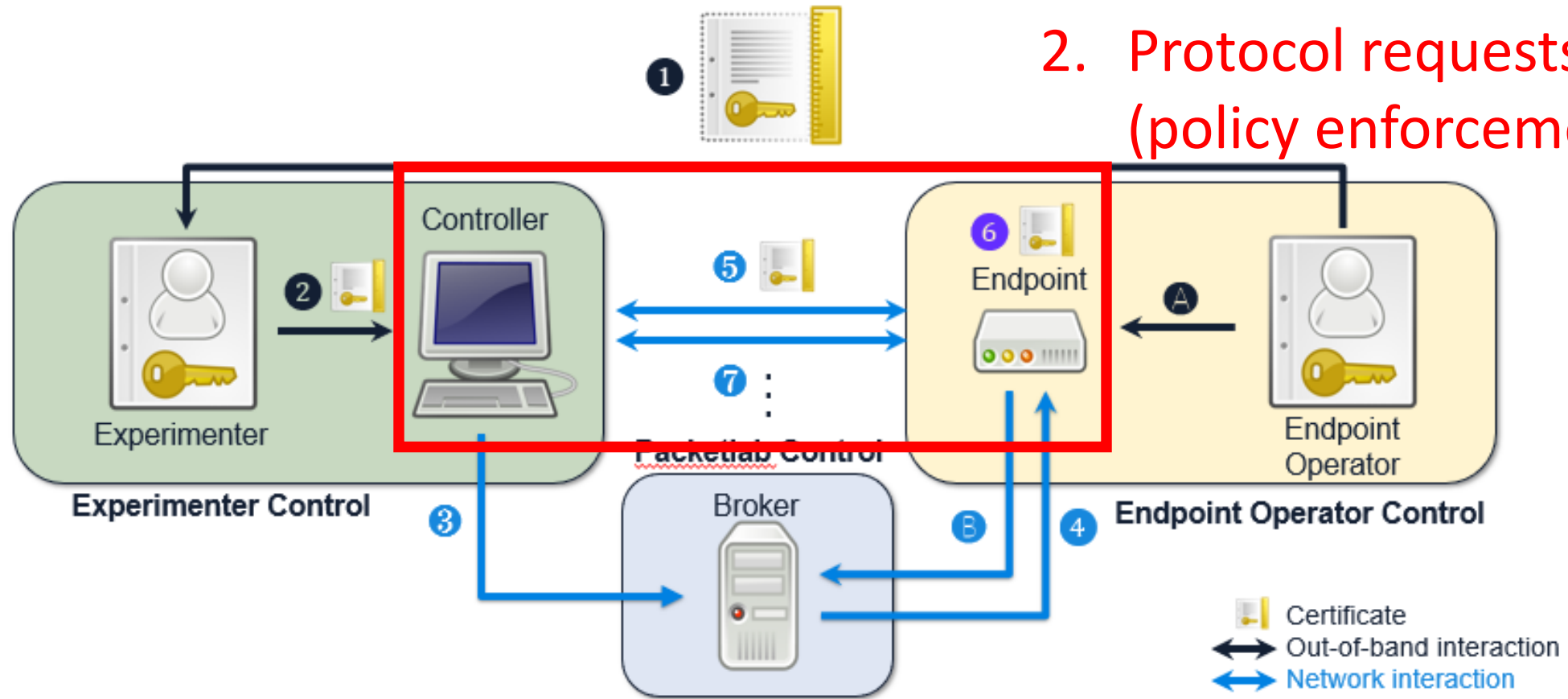

Vantage point / endpoint operator side
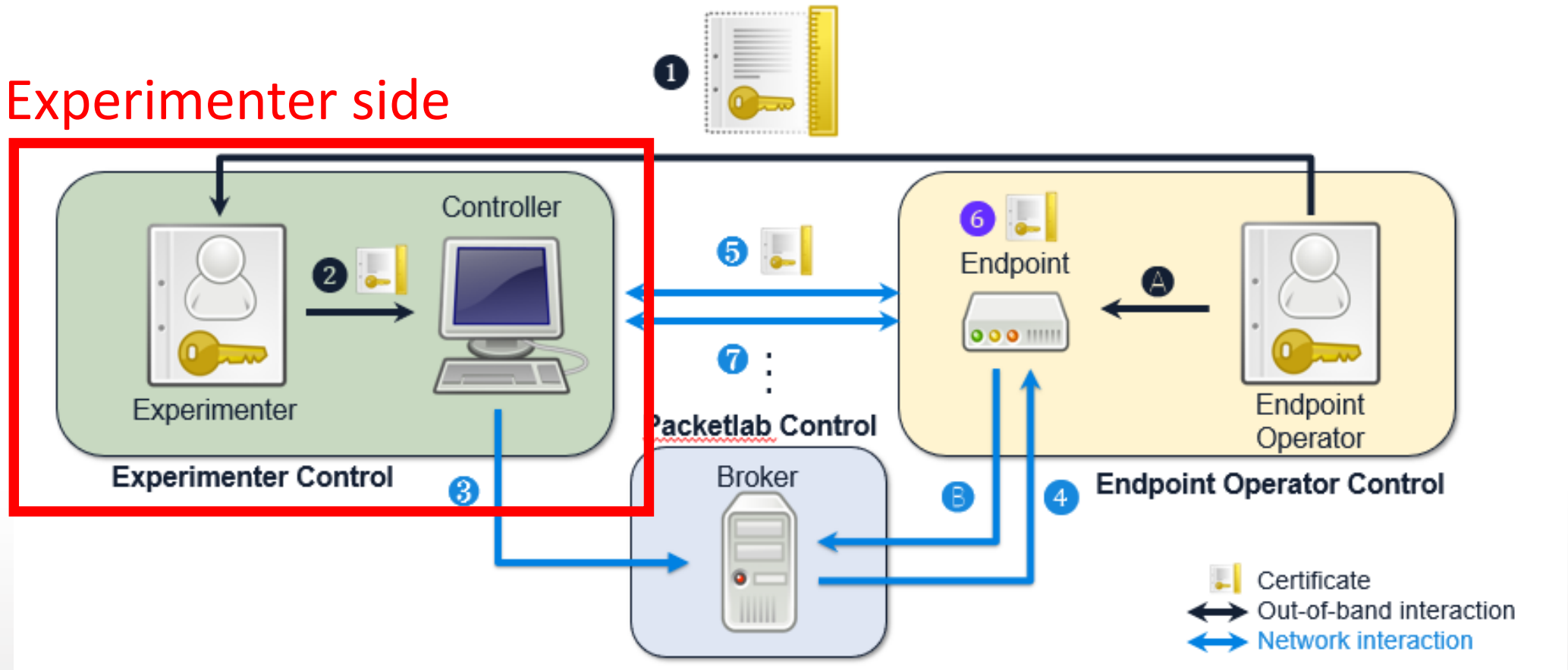
Security - Privilege Provisioning

Experiment privilege provisioning (signing certificates)

Measurement Running and Policy Enforcement

Current Status

- **Software package** released (alpha)
  - Experiment running utilities (pktxpmgr), example measurement and PacketLab reference endpoint implementation
  - See pktlab.github.io (QR code)
- Ongoing and planned future work:
  - PacketLab design analysis (capability, security etc.)
  - Develop missing components – monitors
  - Provide off-the-shelf implementations for common measurements
  - Verification of security design
  - Documentation
  - Cooperate with other platforms on support the PacketLab intf

Q&A