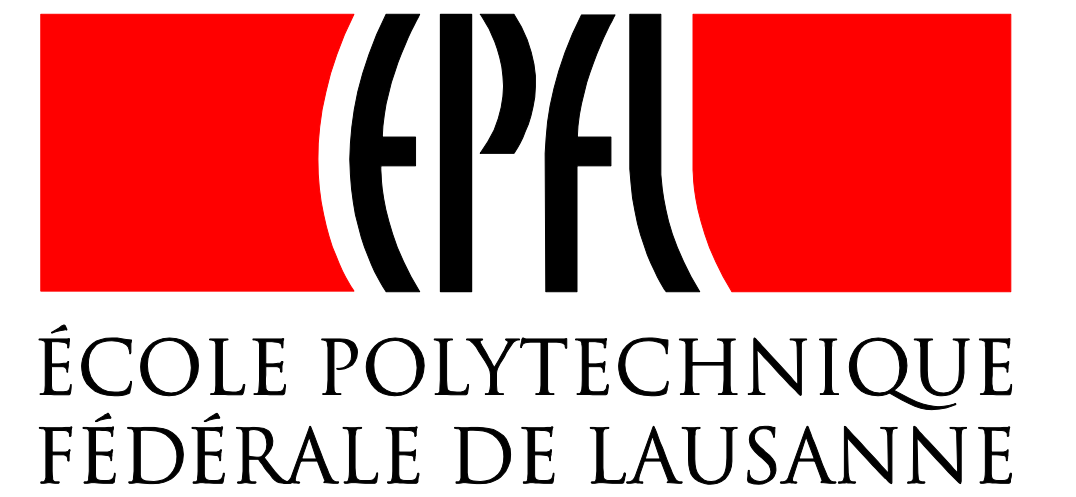
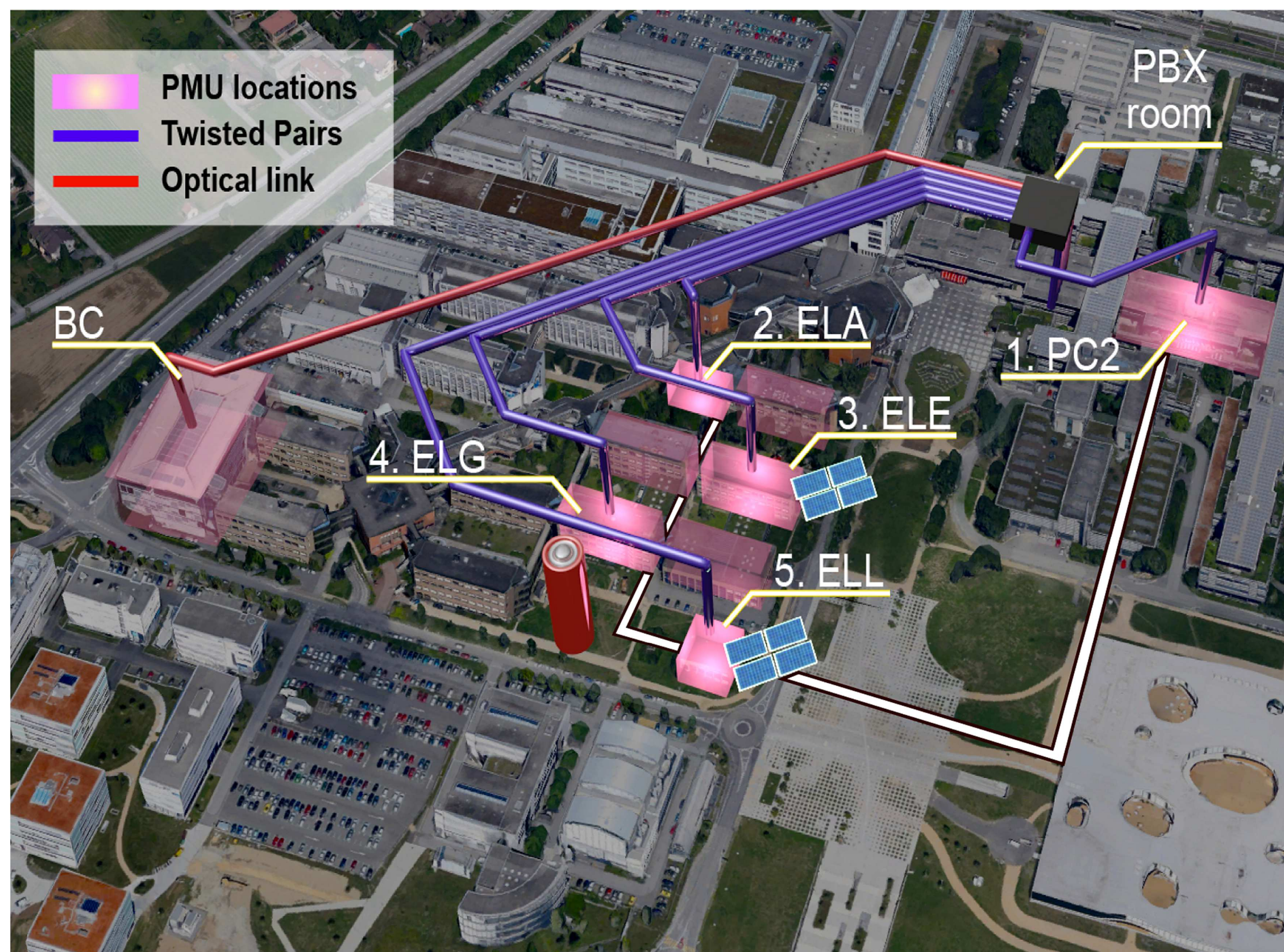


Reliable Communication Network for the EPFL-Campus Smart Grid



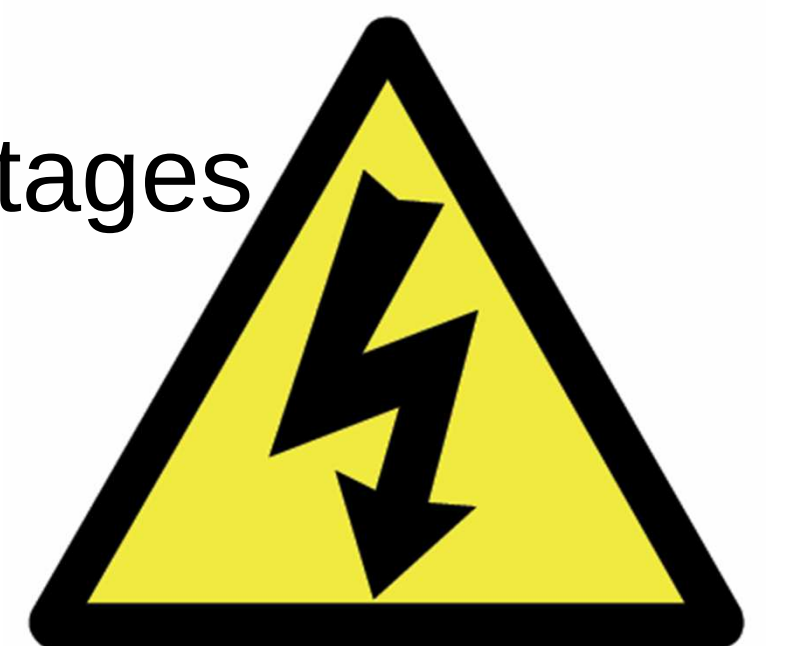
Miroslav Popovic, Maaz Mohiuddin, Dan-Cristian Tomozei, Jean-Yves Le Boudec

LCA2, EPFL



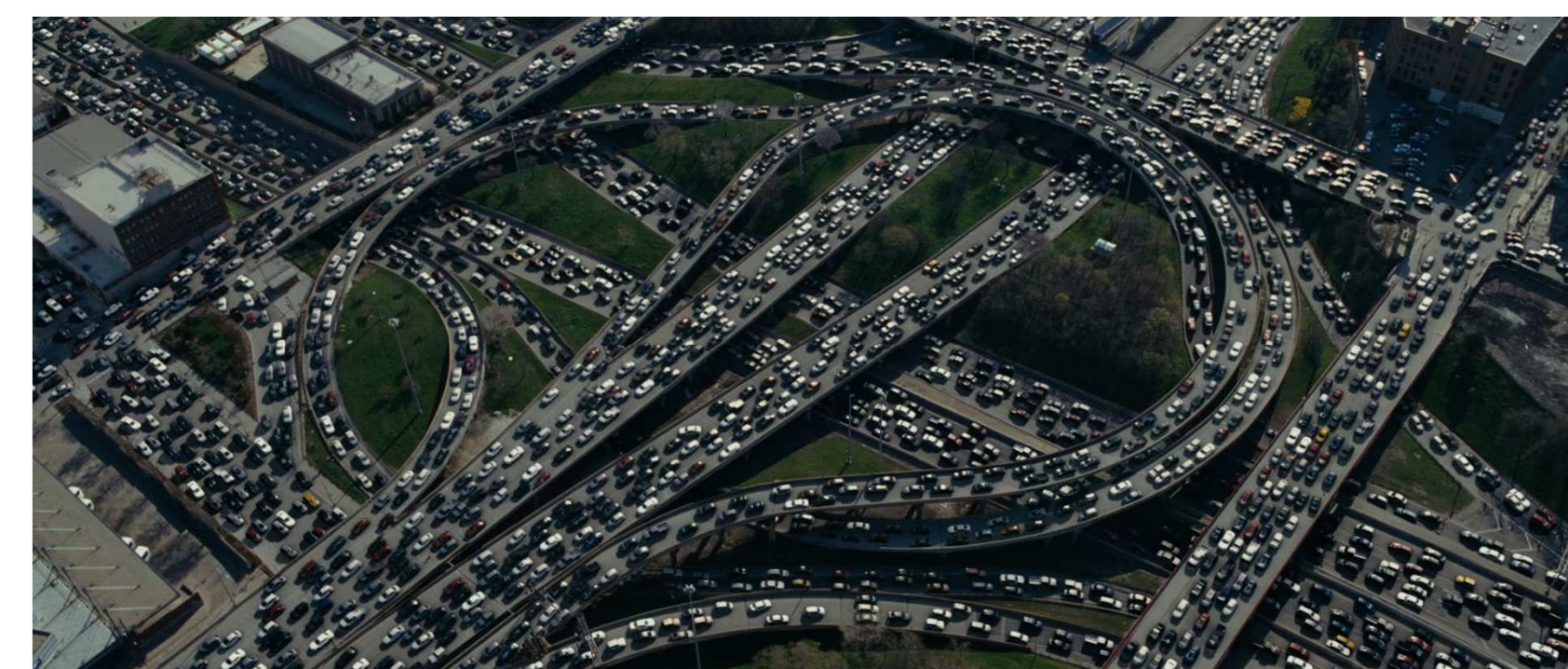
Requirements for the Communication Network

1. Resiliency to power outages



2. Secured from cyber attacks

3. No losses due to congestion



4. No single point of failure

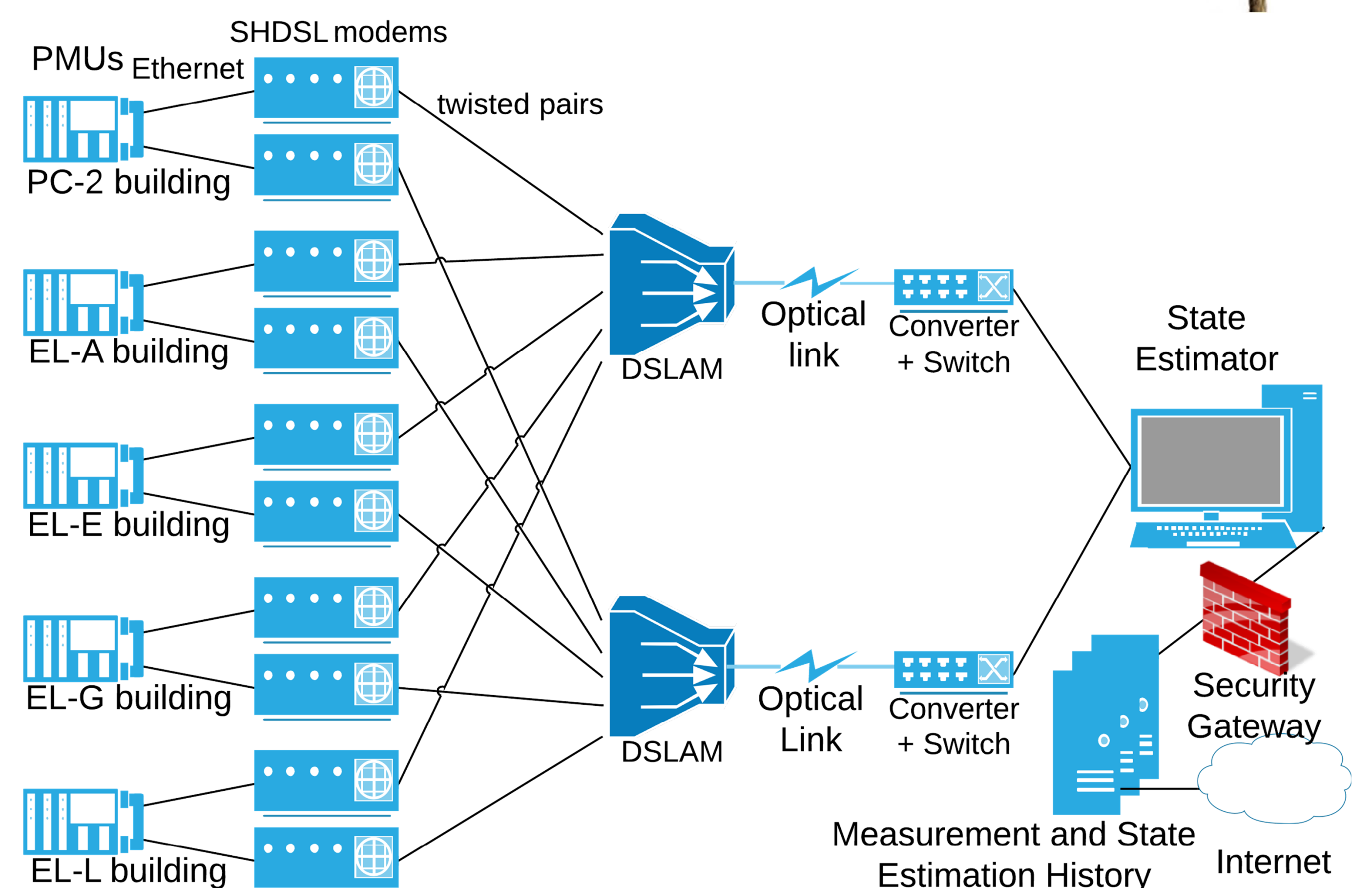


Solutions

- Dedicated** communication network able to withstand blackouts
- Firewall** between our network and the rest of the world
- Traffic engineering**
- We designed a protocol for seamless operation of redundant networks:



IP Layer Parallel Redundancy Protocol



What does it do?

- On the sender side (PMUs): packets are replicated and sent over fail-independent networks
- On the receiver side (State Estimator): forward first copy of a replicated packet to the application and discard all subsequent packets

Why is it so good?

- Ensures 0ms switchover.
- Applications are unaware of the replication process.
- Routers are unaware of the replication process.
- Supports IP and multicast.
- It is soft-state; devices can join and leave at any time.
- Selective packet replication.
- It comes with network diagnostic tools.