Vertical Integration in Emulab and ProtoGENI

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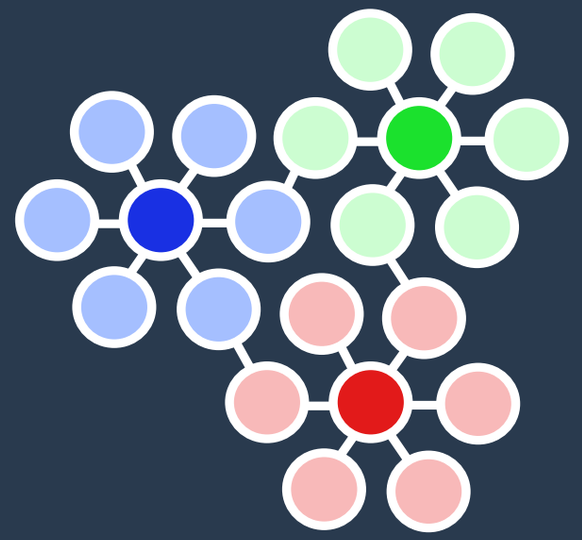
THE UNIVERSITY OF UTAH



emulab

ProtoGENI is:

- Control framework
- Nationwide backbone
- Component manager with diverse components
- Set of integrating projects

ProtoGENI as a Component Manager

- Based on Emulab - all about controlling networks
- Adds GENI CM API on top of Emulab software
- Sampling of components supported:
  - Wired PCs (whole)
  - Wireless PCs (whole)
  - Switches (shared)
  - PlanetLab nodes
  - PCs sliced with jail (FreeBSD) or OpenVZ (Linux) *
  - Sensor network nodes *

Control Channels

- Control Ethernet/IP network
  - DHCP, network boot
  - TMCD
  - SNMP
  - Event system
- Where possible: Serial consoles, power control

Two strategies

- Pull
  - Used for PCs and other rich components
  - Nodes check in for config. params. at boot time
- Push
  - Used for switches, sensor nodes, etc.
  - Reconfigured from central location at sliver creation time

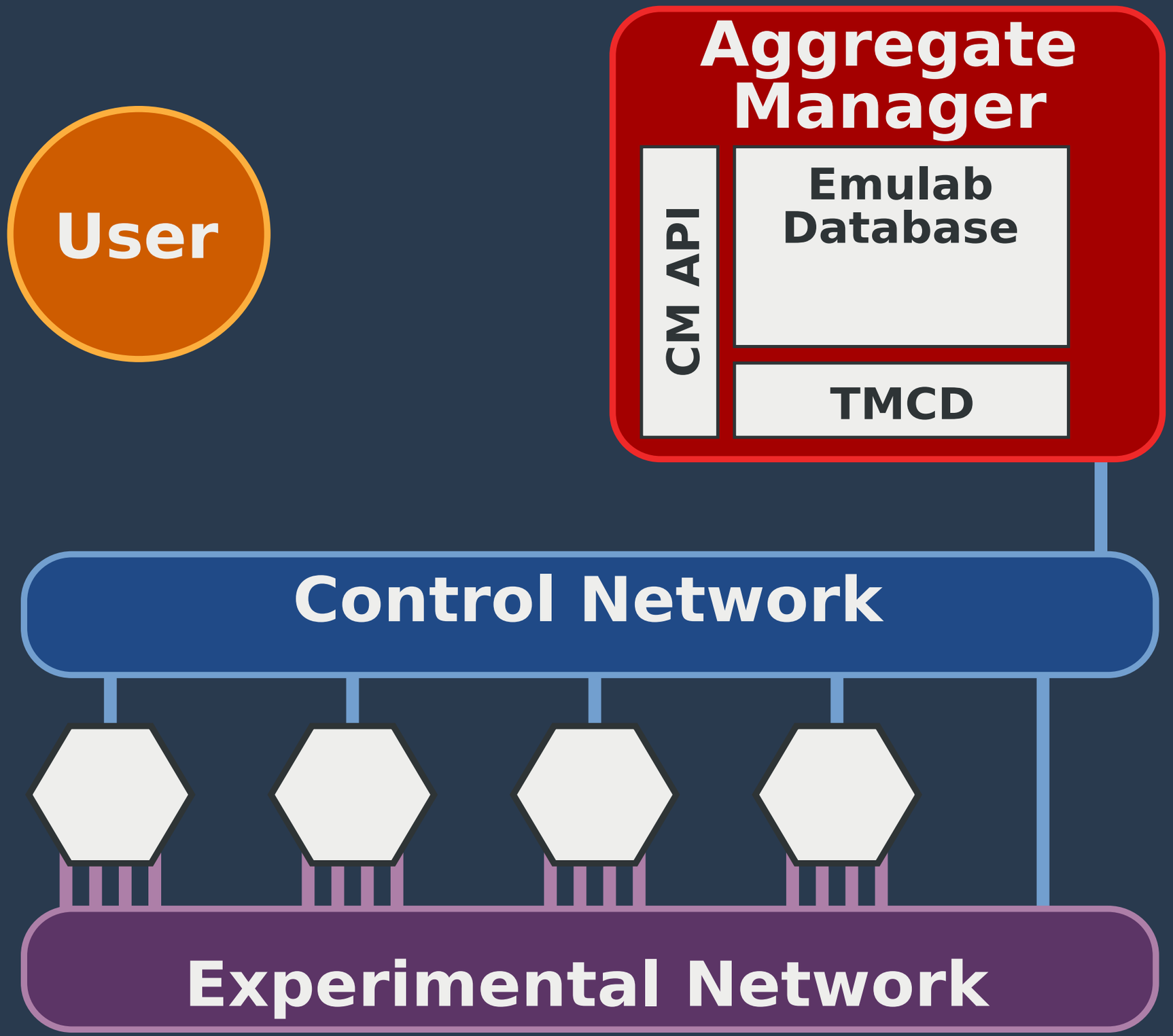
Making a Sliver: Pull

- Initial sliver creation done in database
- Make real by "booting" component
- Checks back in with database
  - TMCD, custom protocol
  - Becoming more open/extensible
- Client scripts turn generic parameters into device-dep. config
  - Porting to new components

Making a Sliver: Push

- Support in Emulab today:
  - Switches: several vendors
  - Sensor nodes
  - Network processors
- Much more device-dependent
  - Some SNMP
  - Some custom protocols
  - Some "pushed" through host PC

Making Slivers



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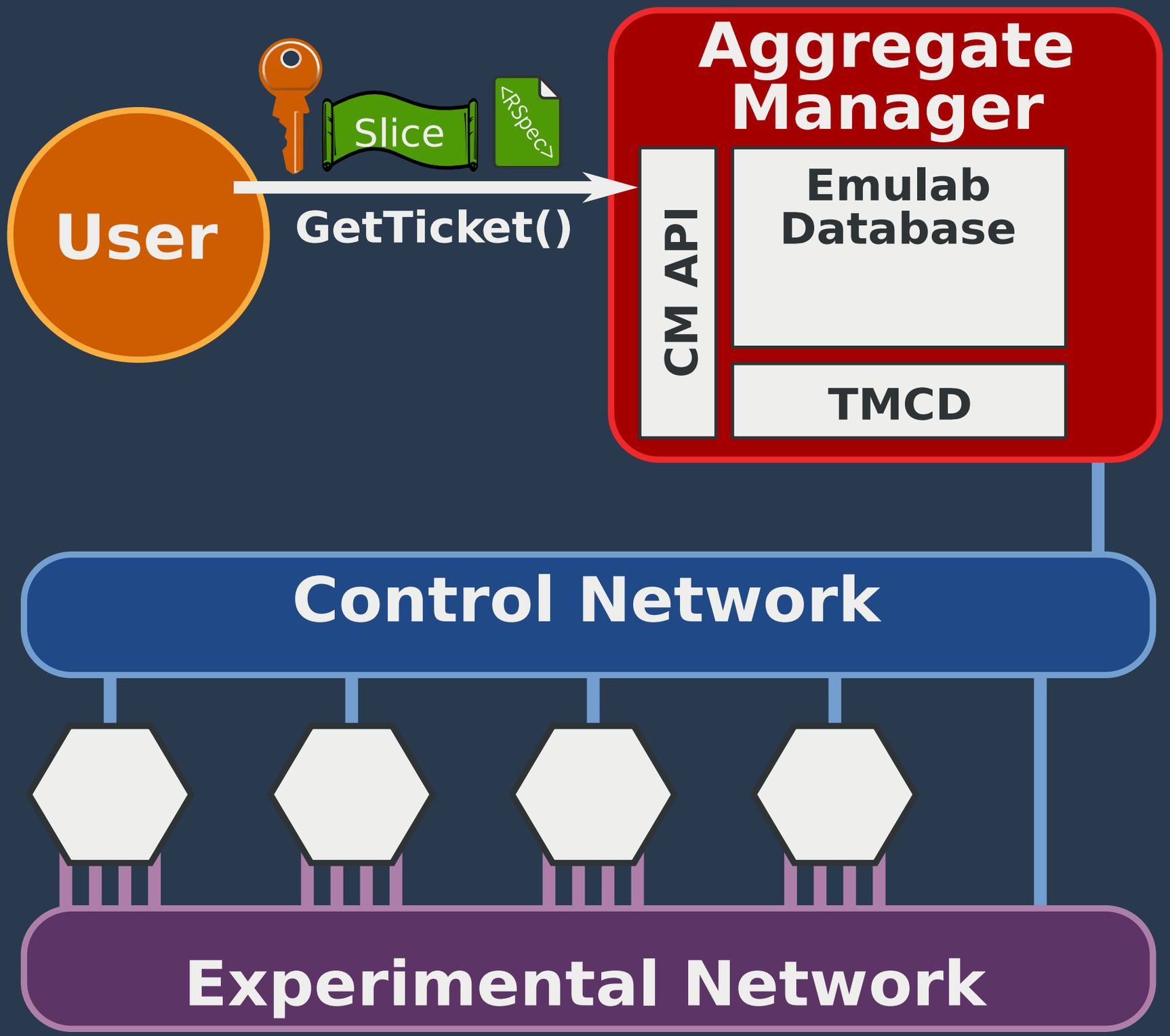

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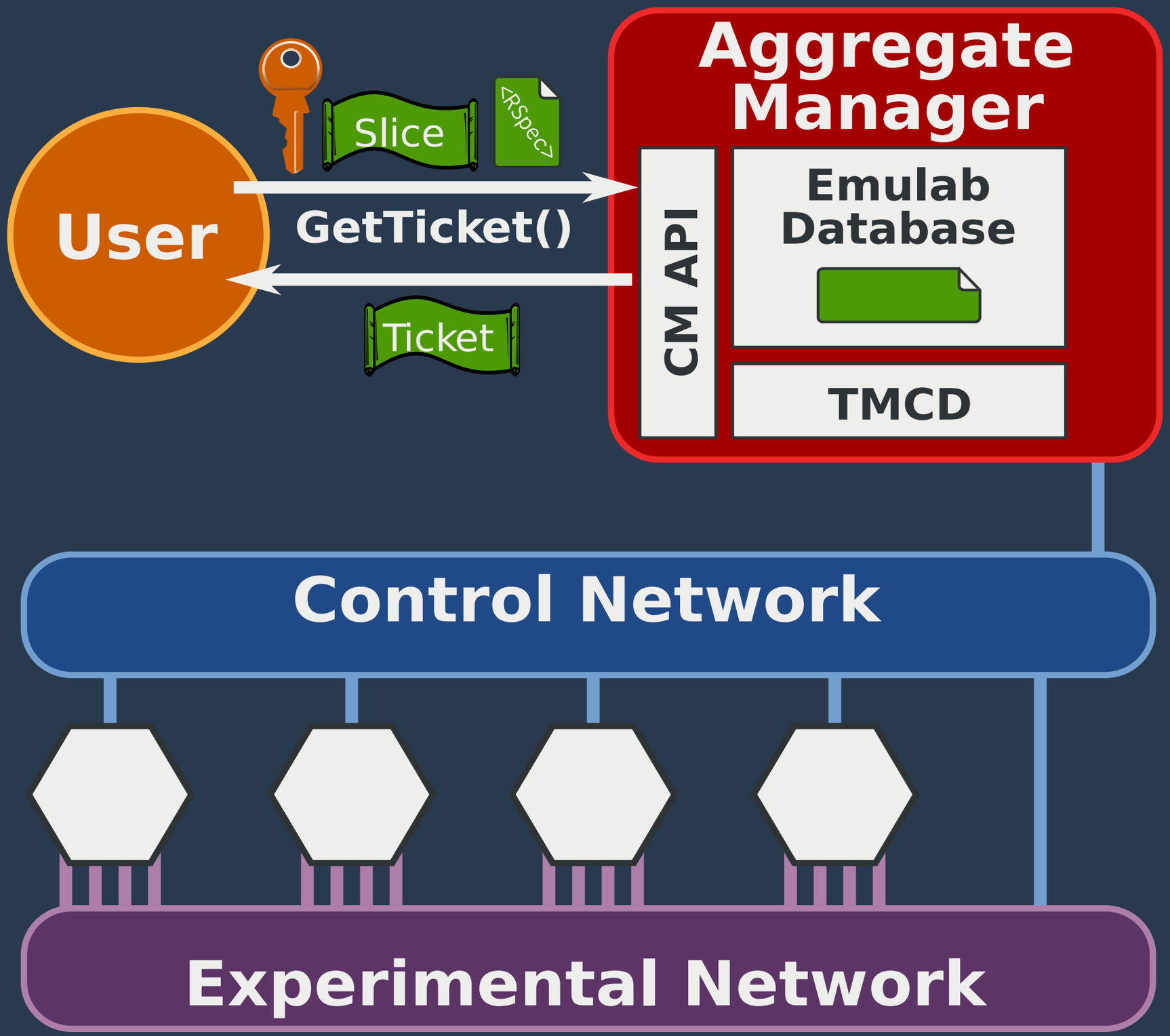

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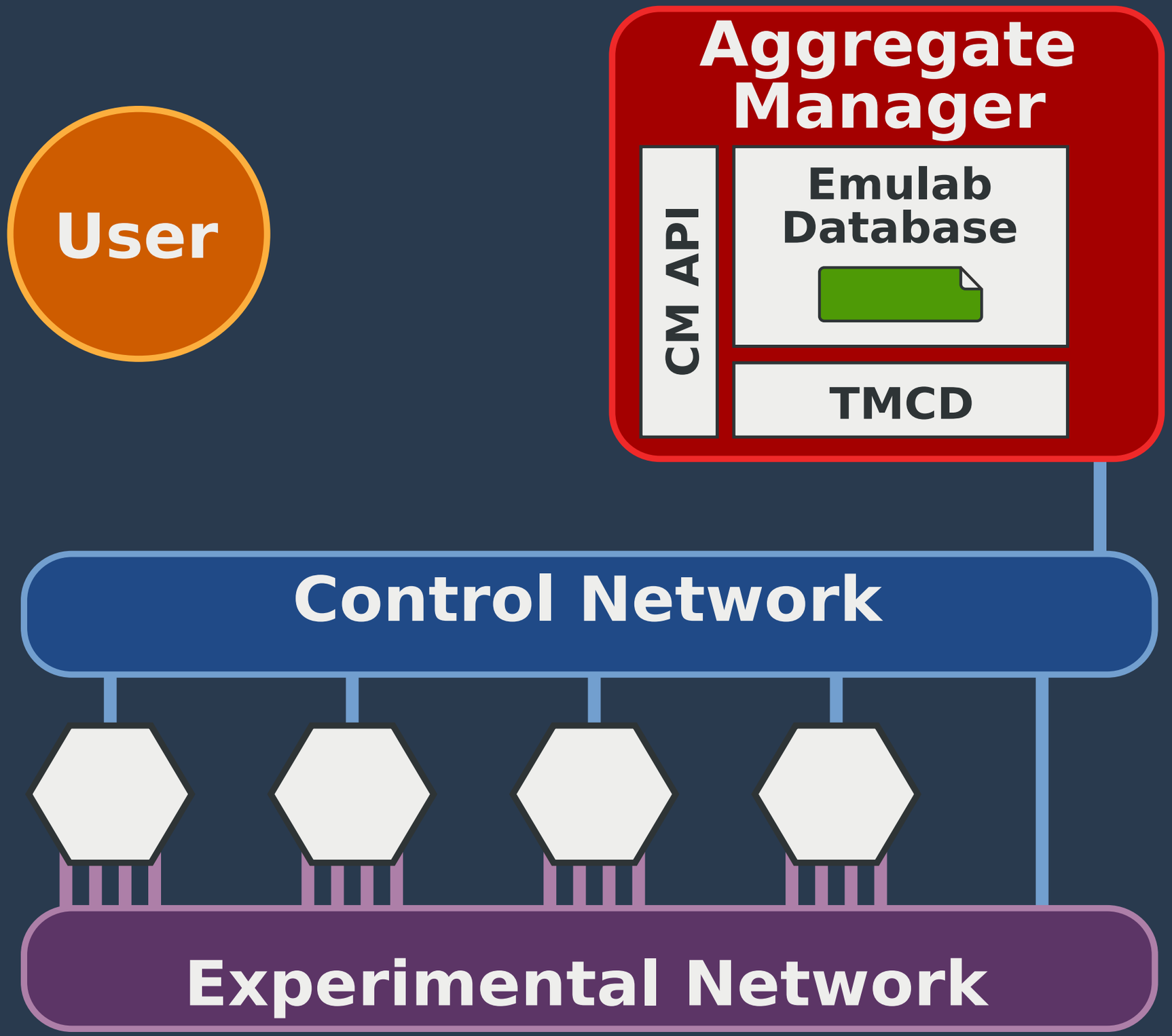

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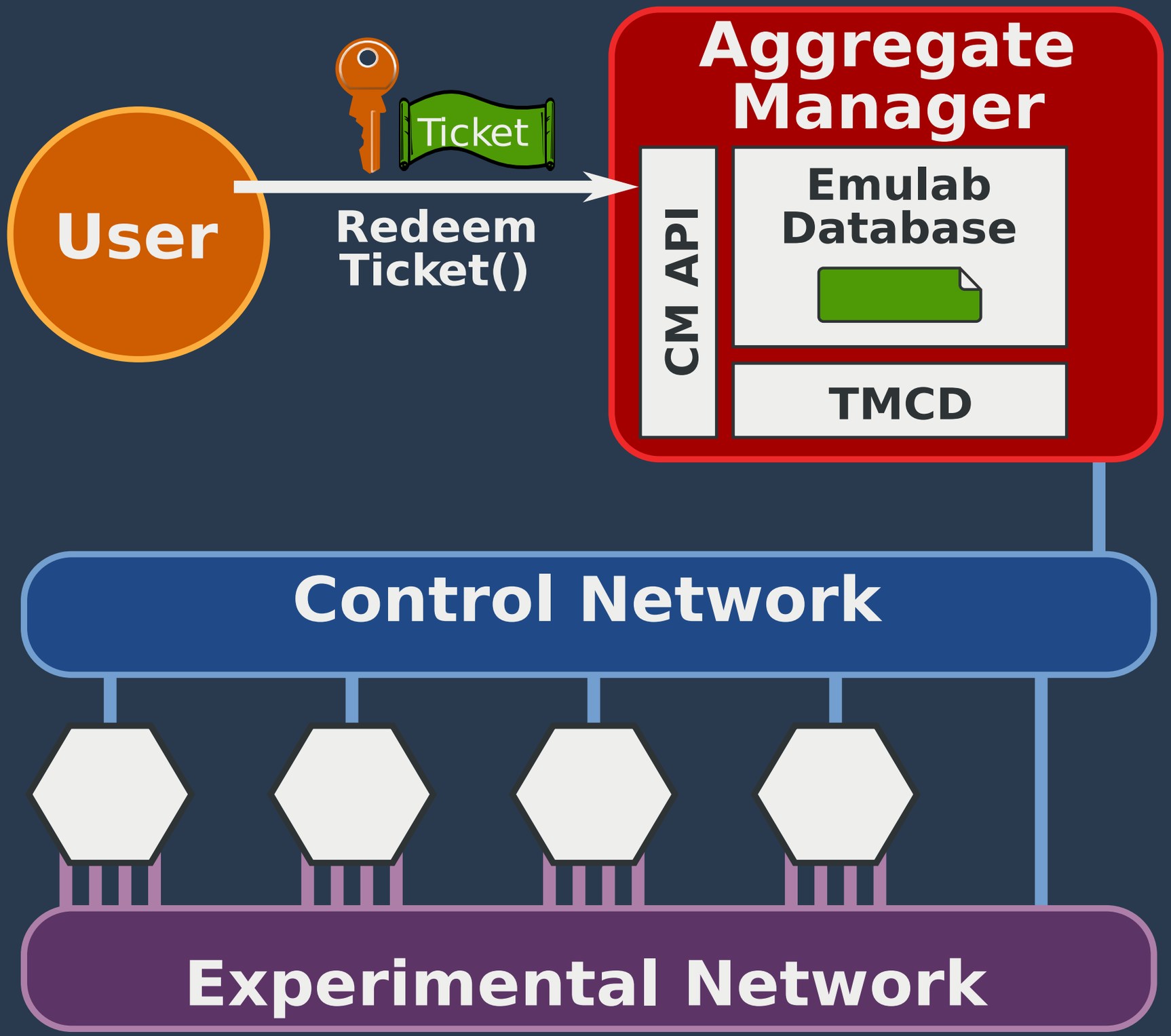

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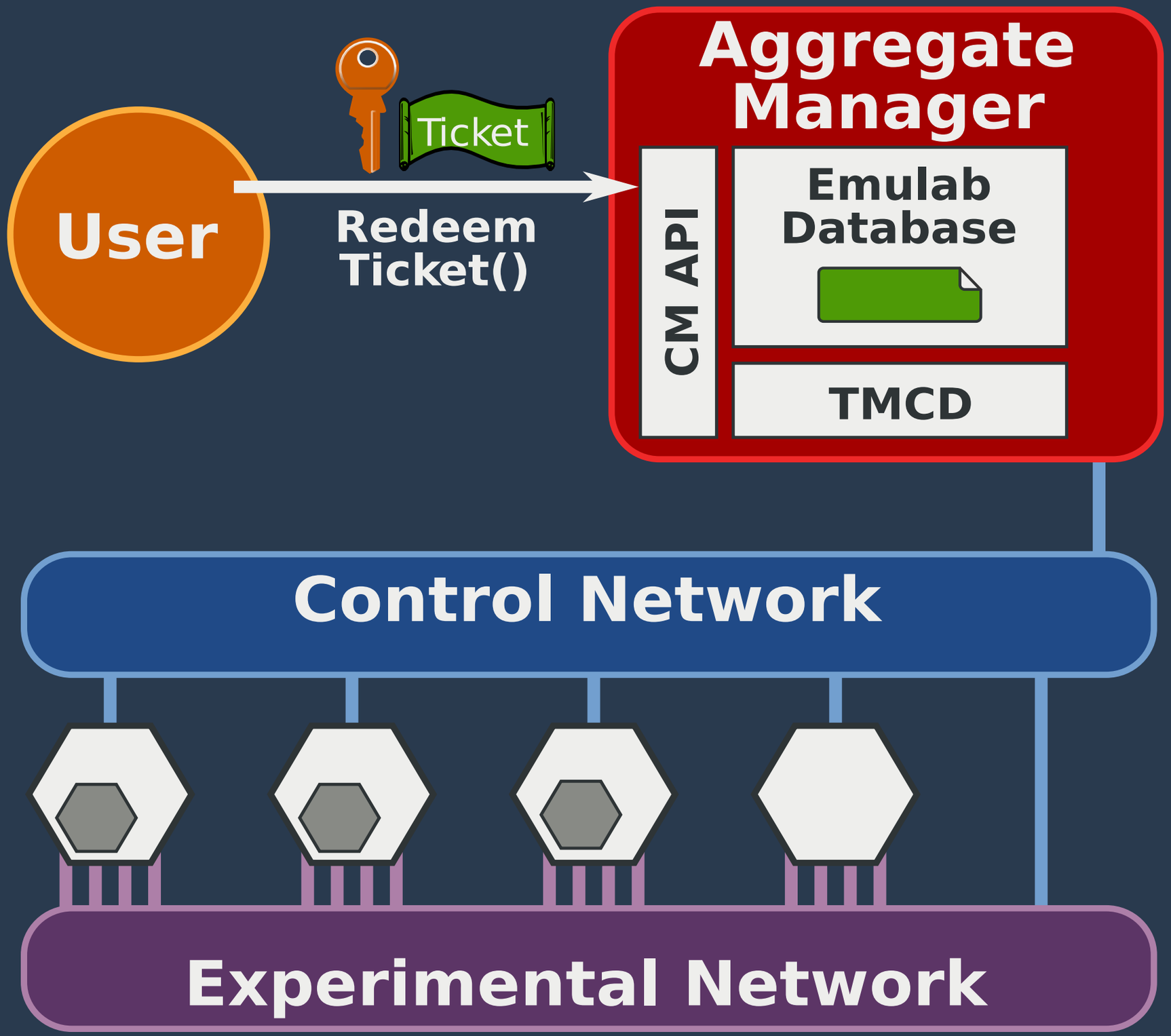

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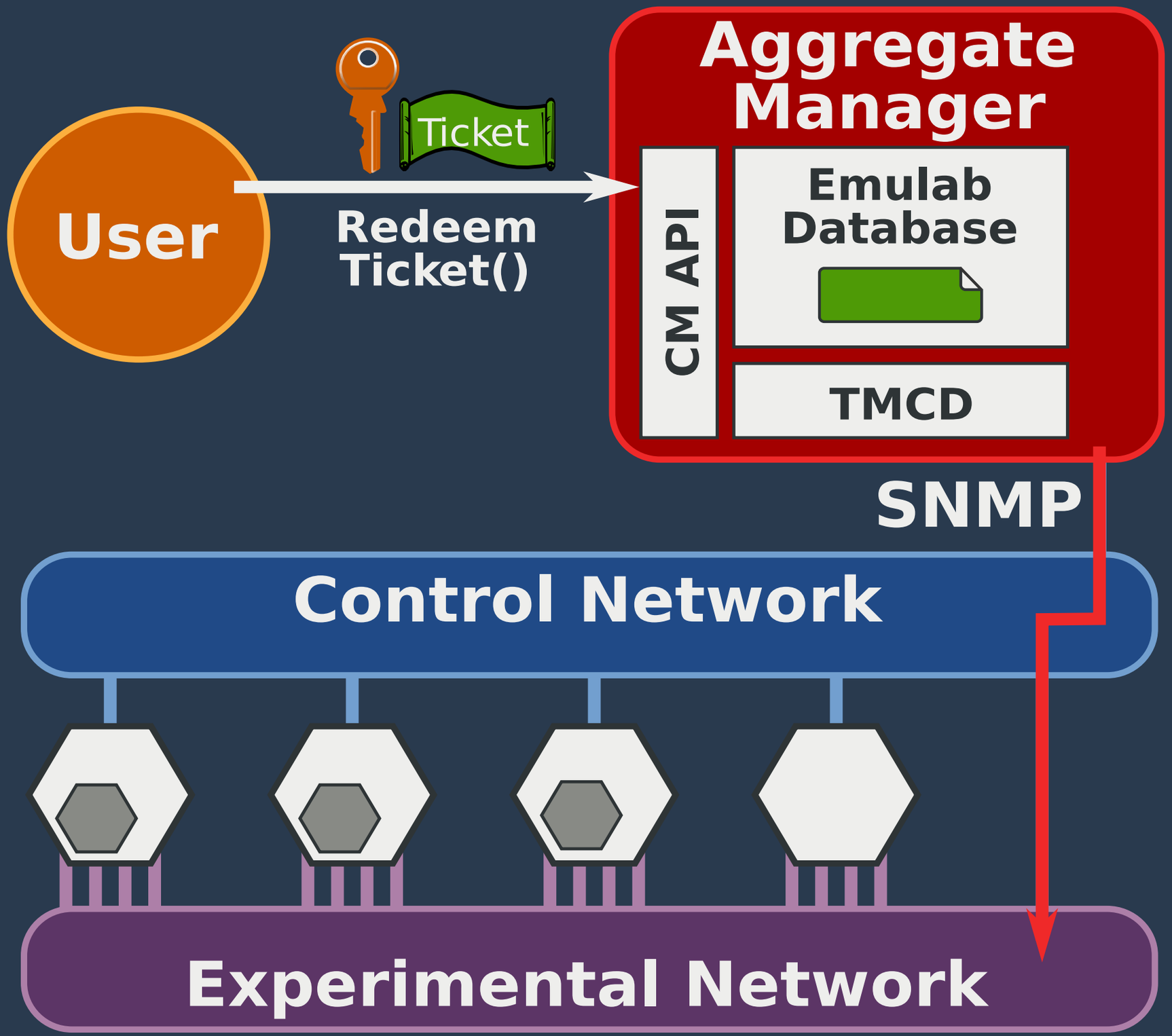

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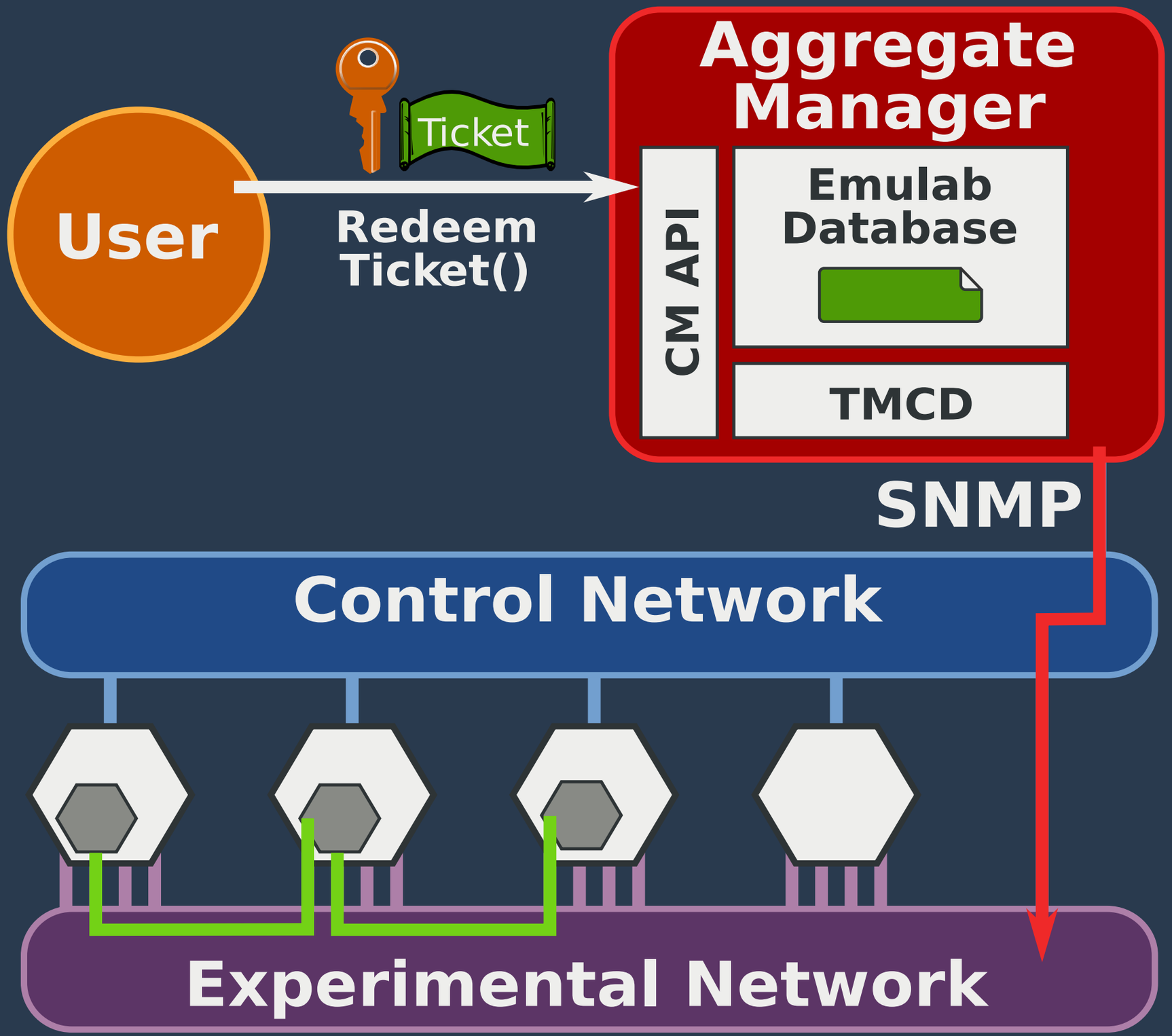

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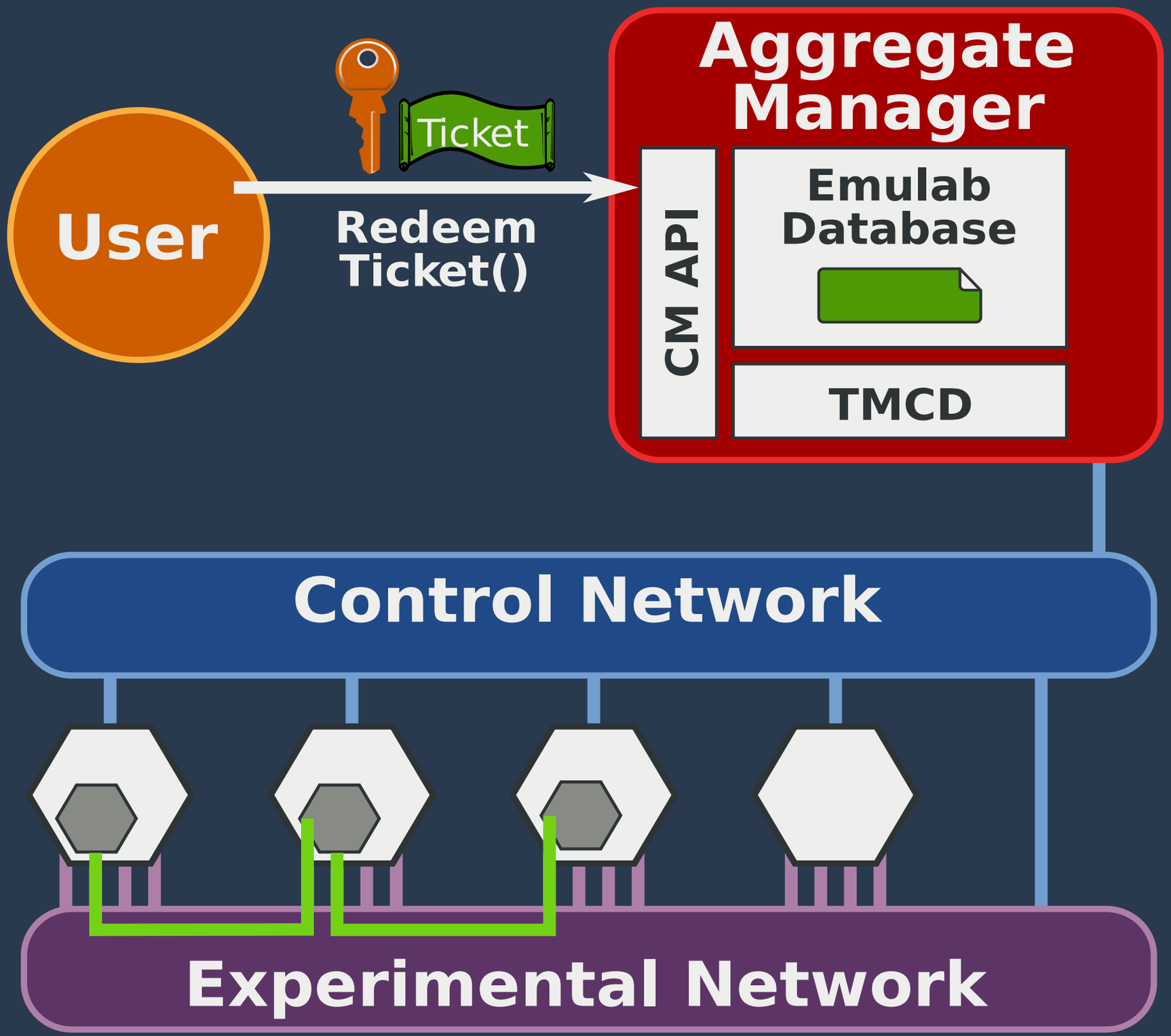

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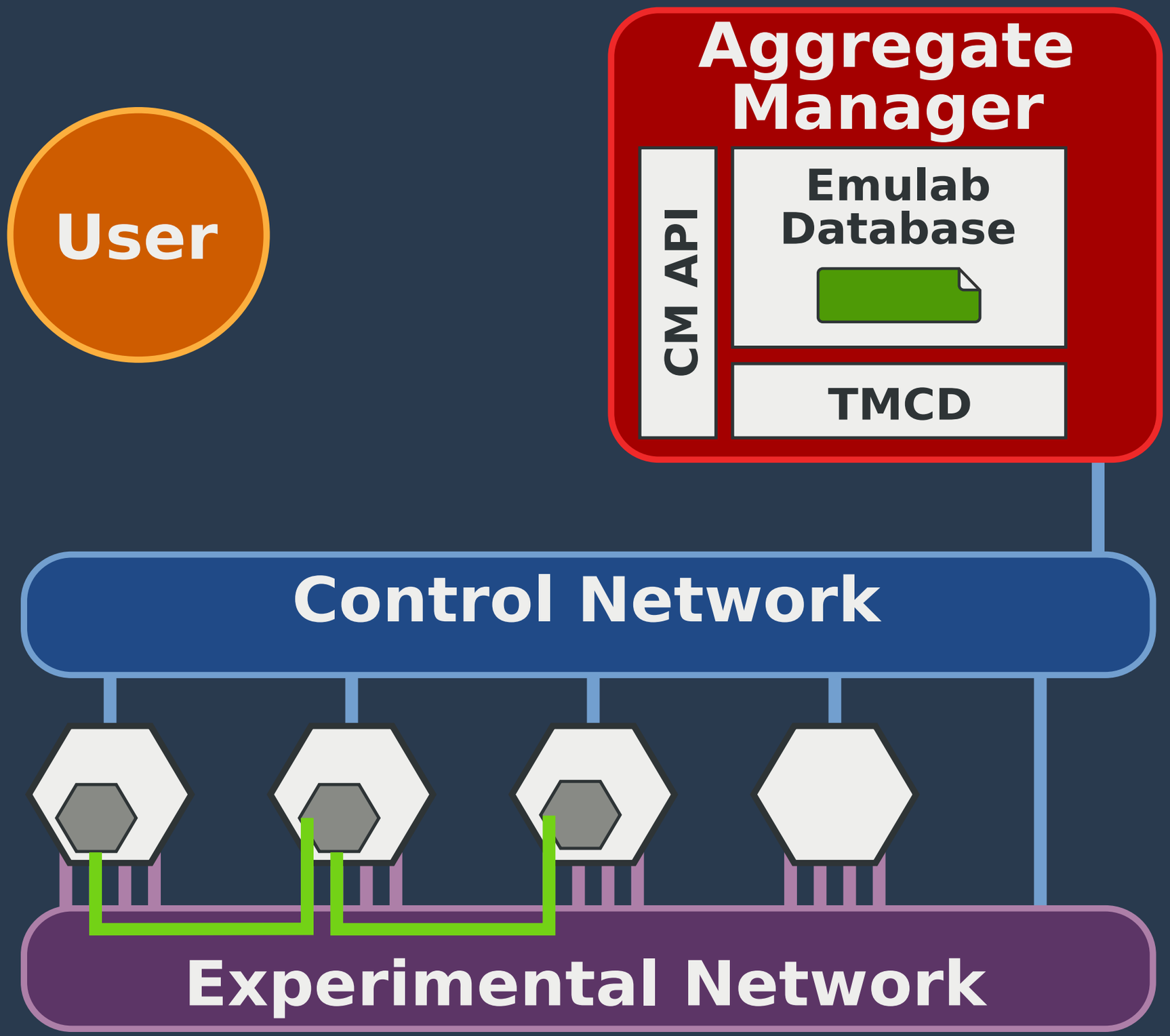

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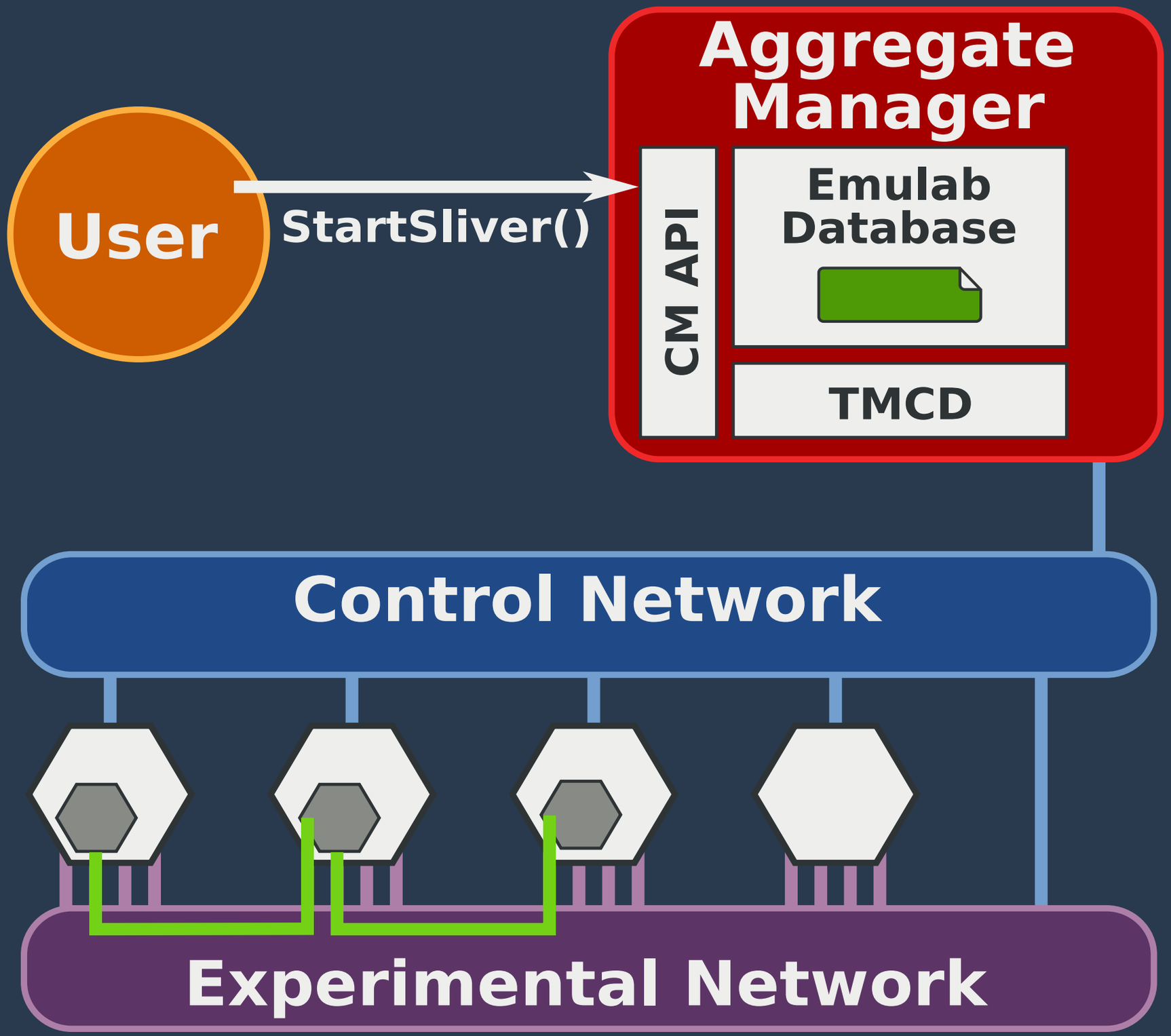

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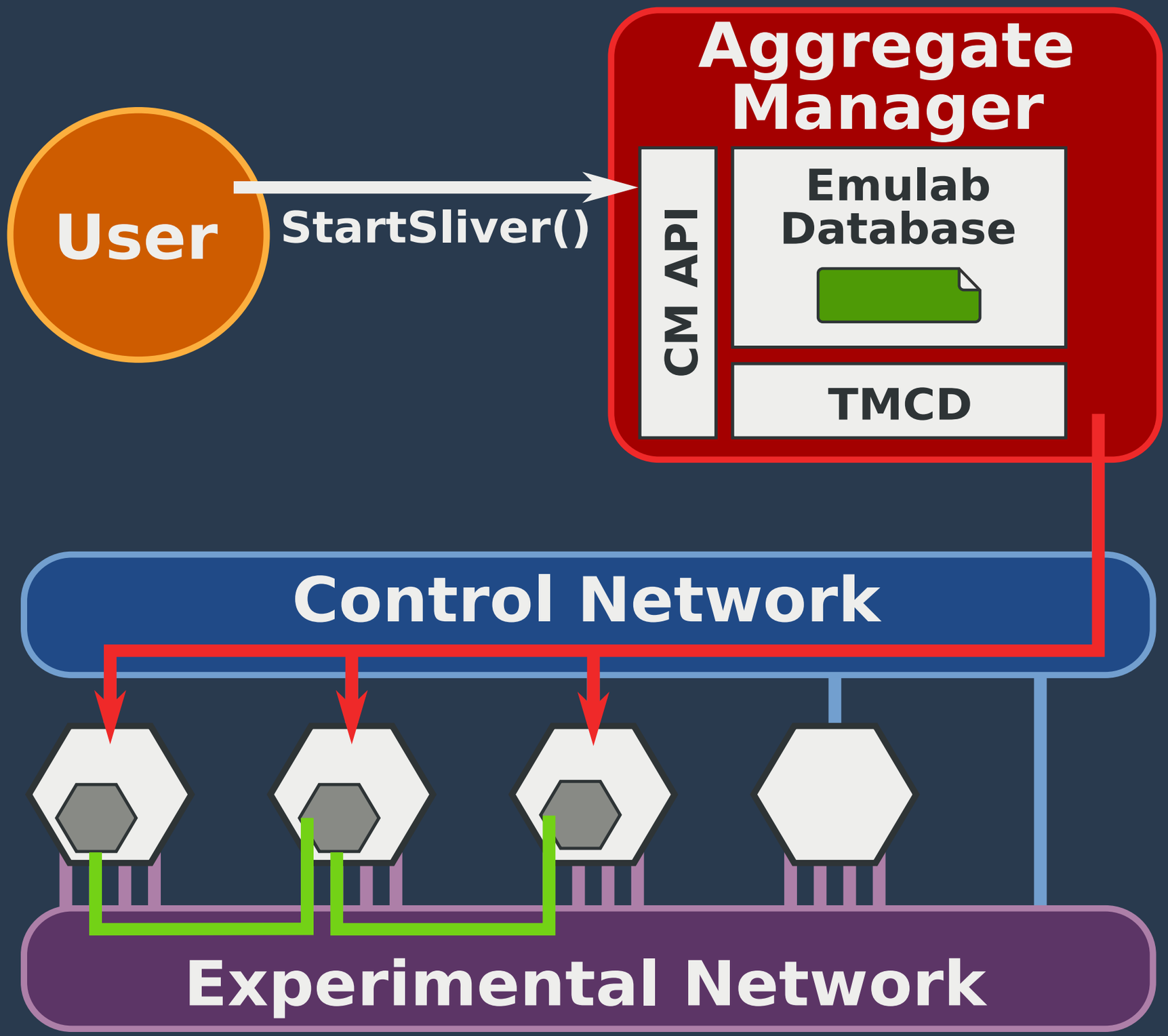

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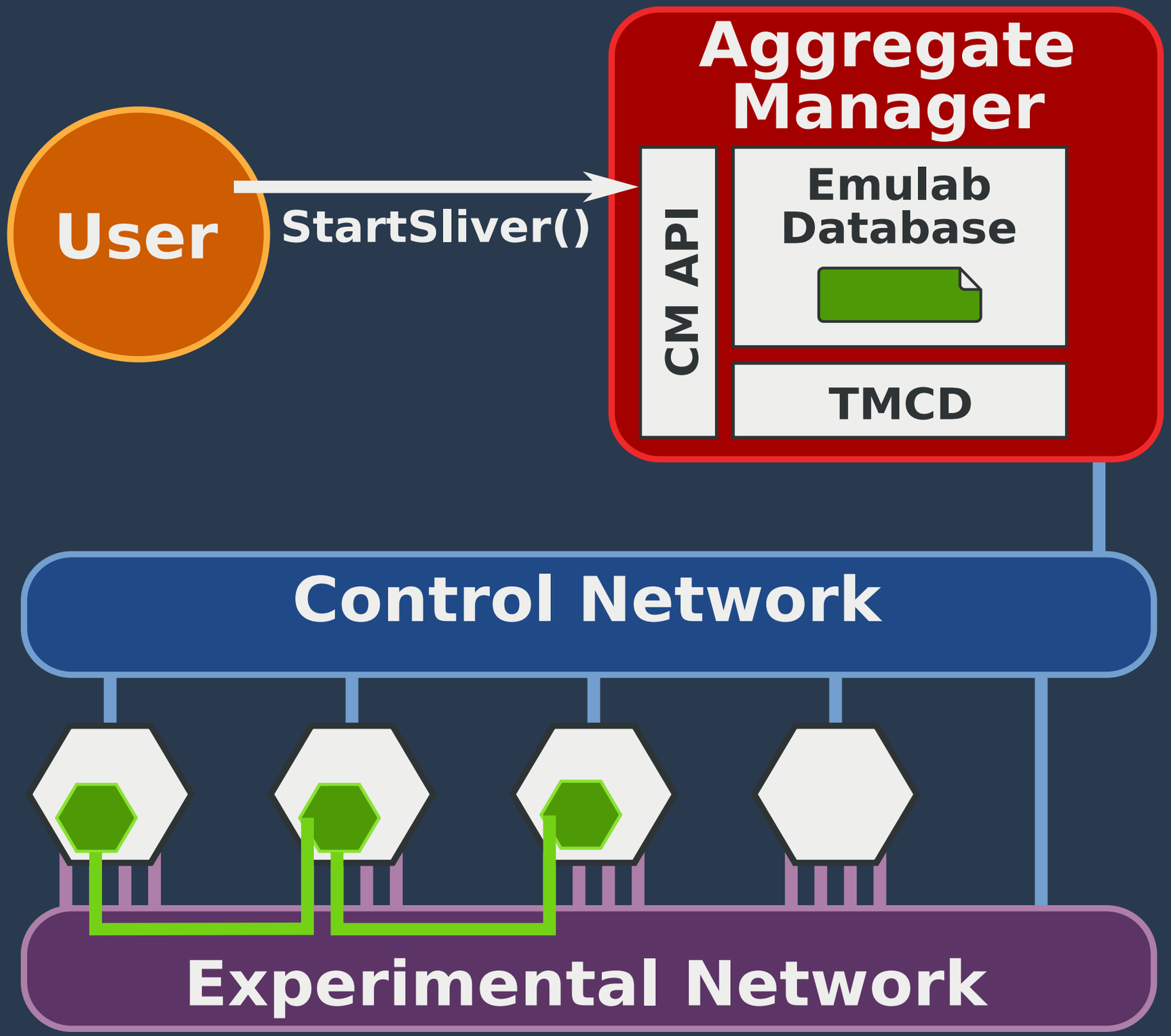

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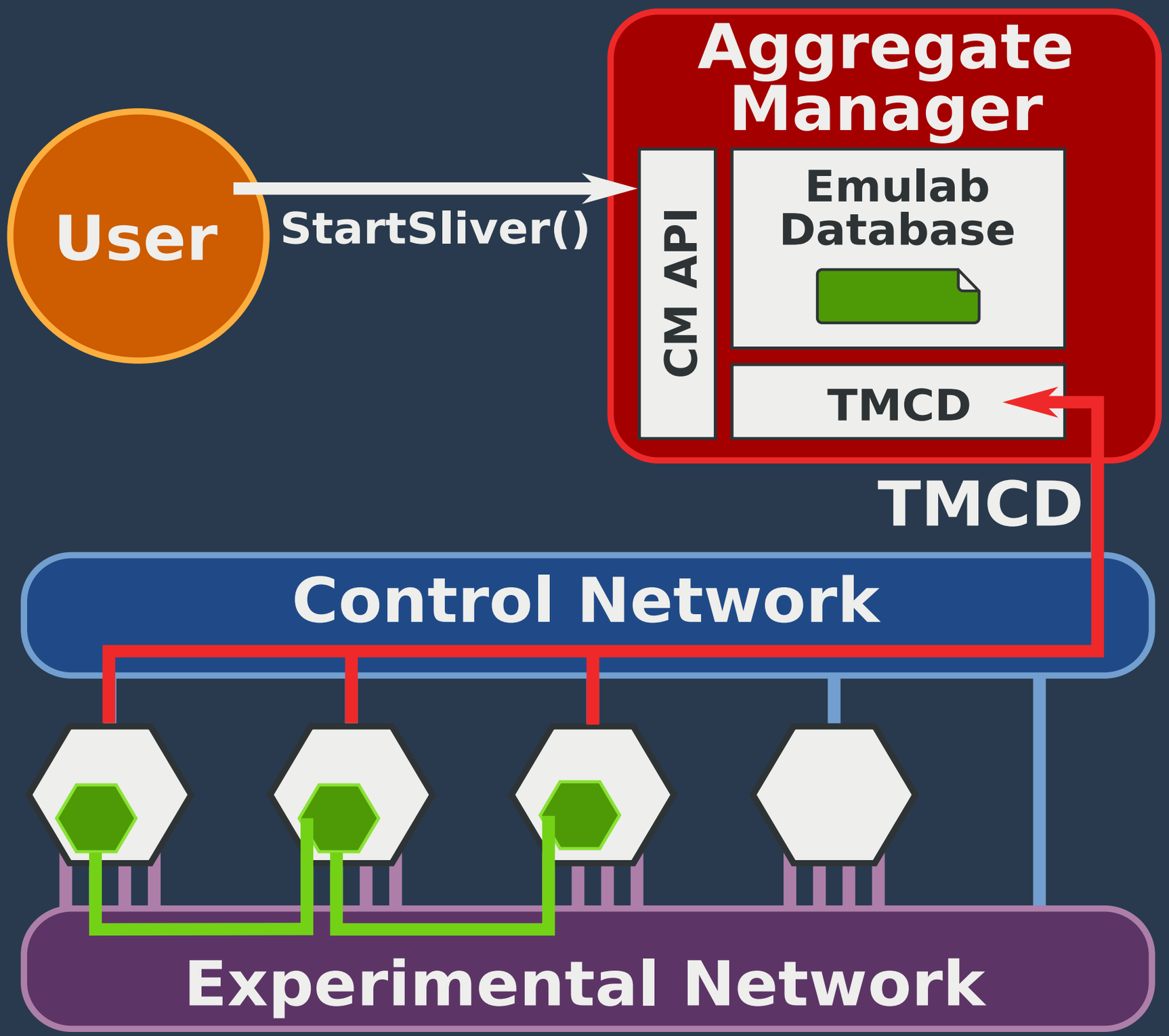

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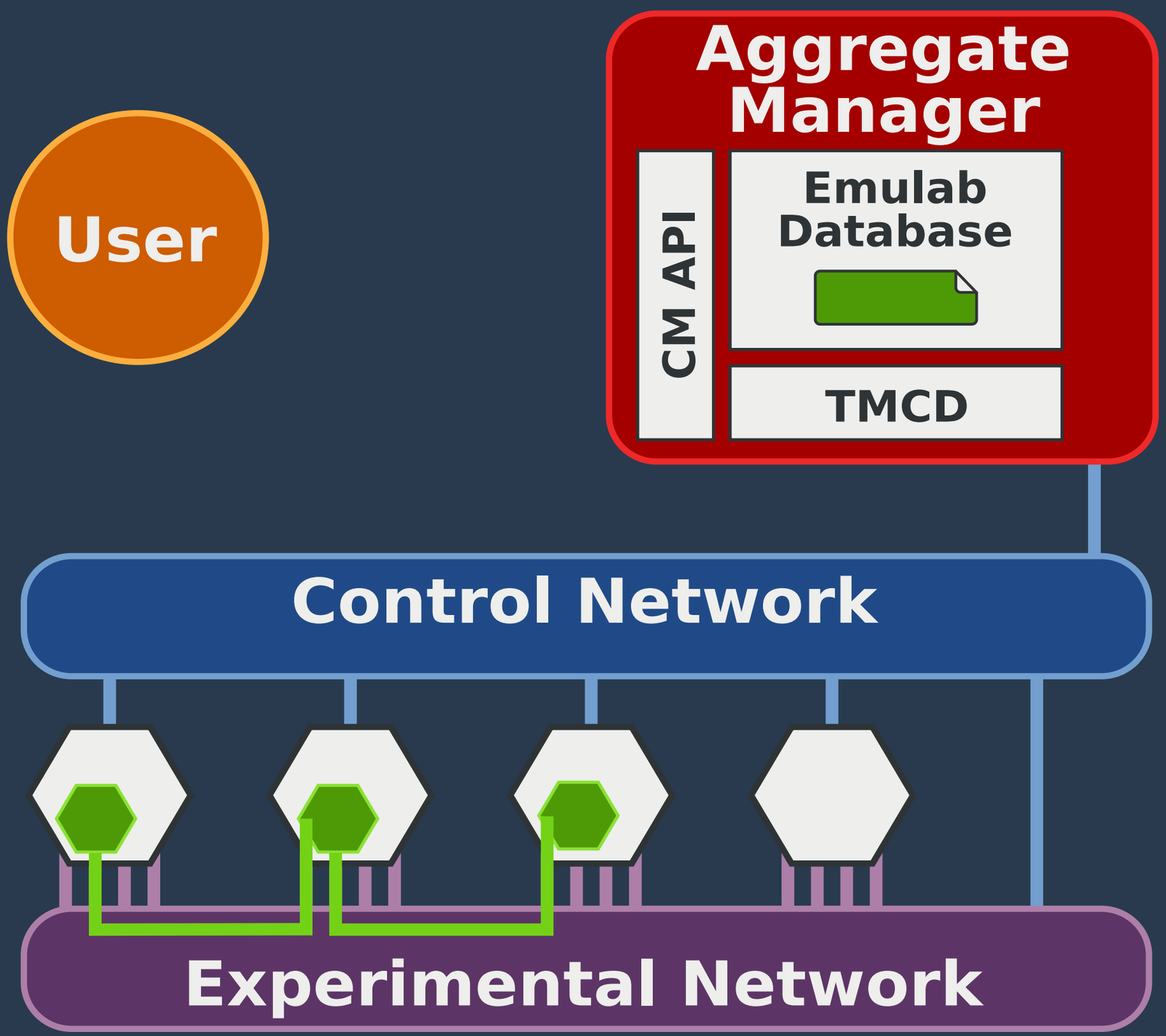

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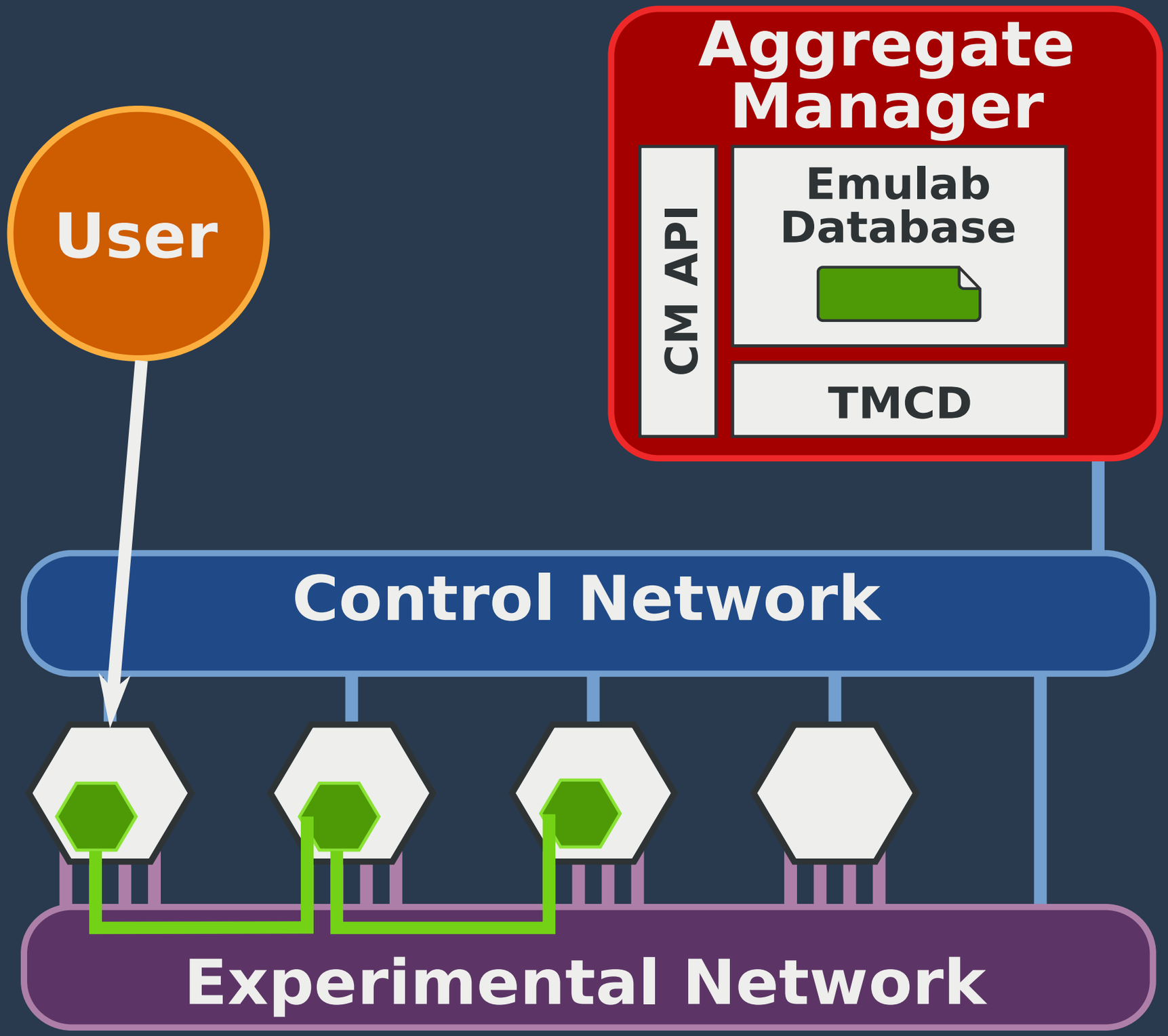

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