

SCC-PG: Edge Computing for Bringing Smart Services to Under-served Urban Communities

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Context

- We use the internet for everything today
- Remote work became the norm
- Web based tools like Google Classroom are commonplace

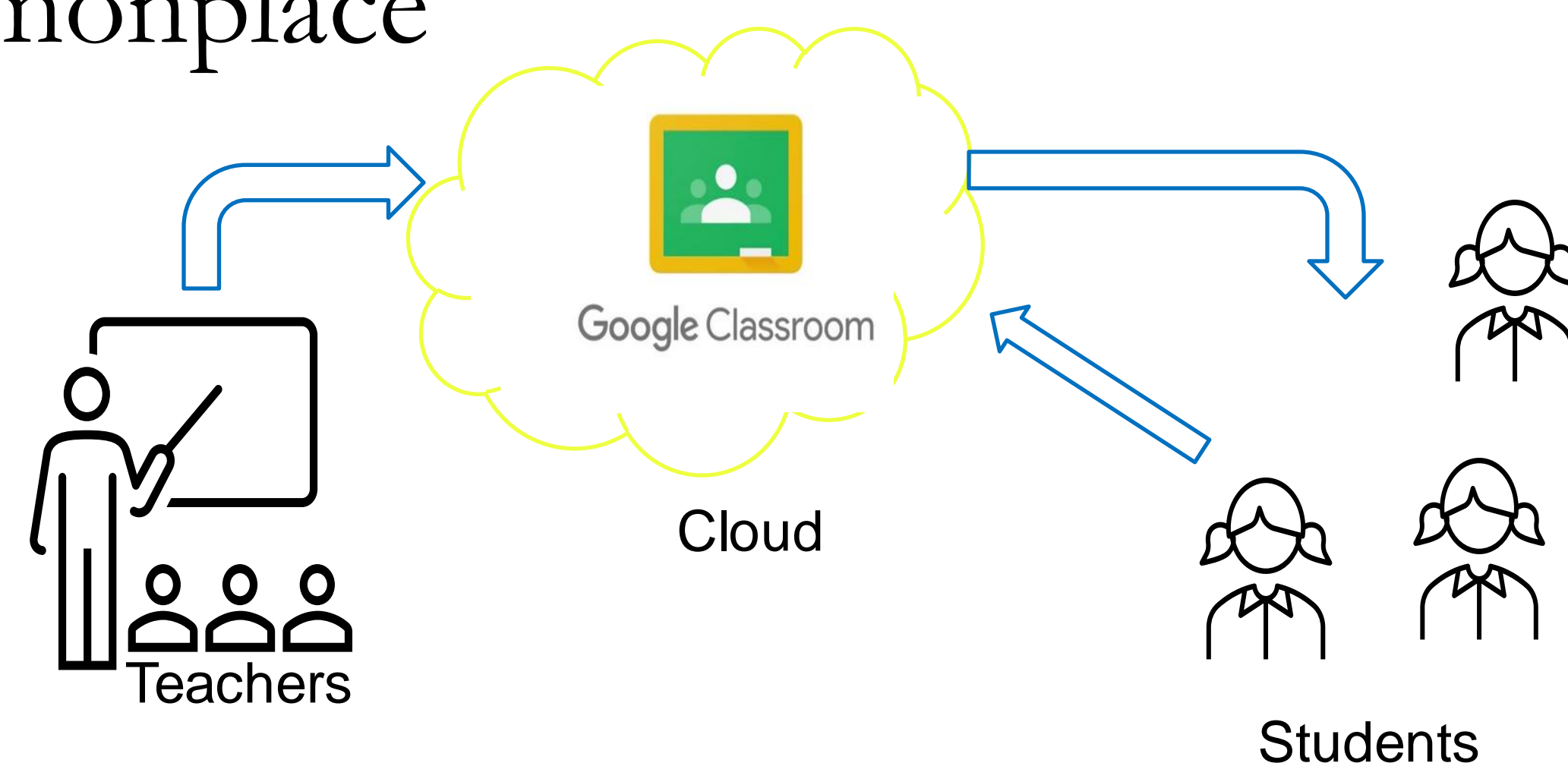


Fig 1: Role of Internet in Education

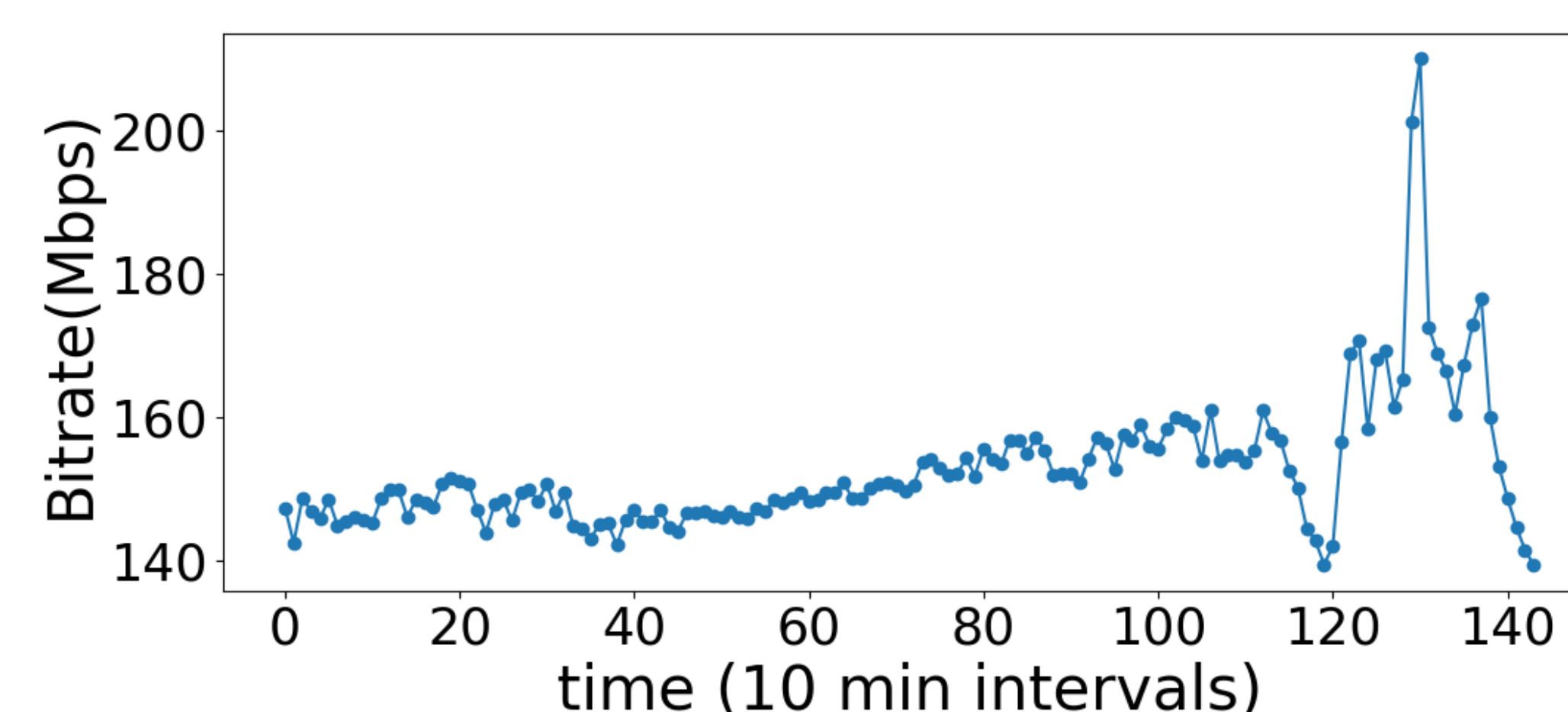
- **Homework Gap:** One-third (35%) of households with children ages 6 to 17 and an annual income below \$30,000 a year do not have a high-speed internet connection at home [1]
- **Homework gap in Atlanta** The Westside of Atlanta is a low-income neighborhood [2] with average income \$24778

A Way Forward with Meshes

- Community mesh networks are an affordable means of connectivity to the Internet
- Enables communication within the community
- Host services such as online forums, video conferencing and street cameras
- Server nodes connected wirelessly

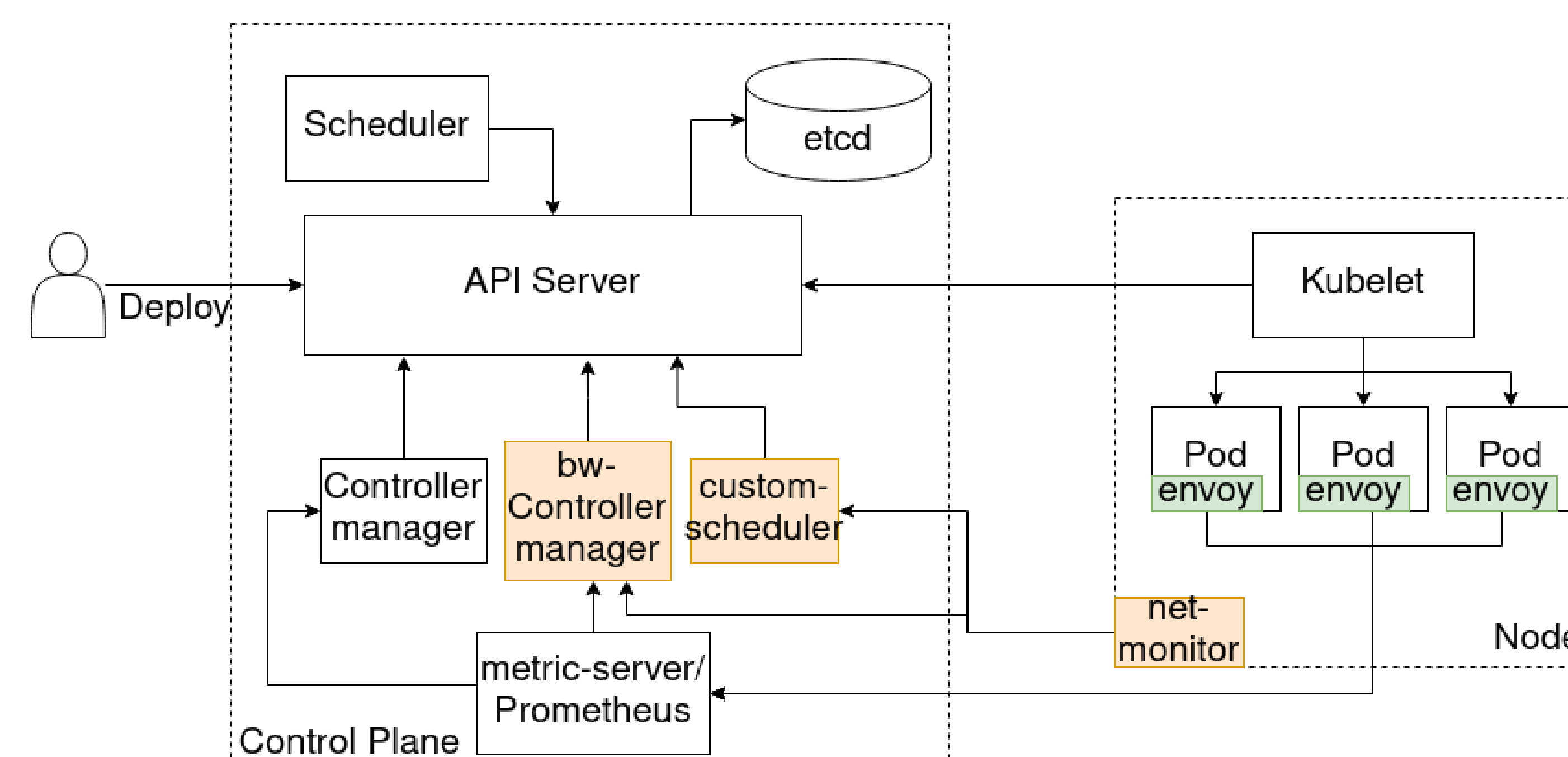
Challenge

- Links have different capacities
- Bandwidth may vary over time
- Temporary obstructions may pop up
- Present day schedulers and orchestrators are designed for wired networks
- How to manage the deployment of these applications?



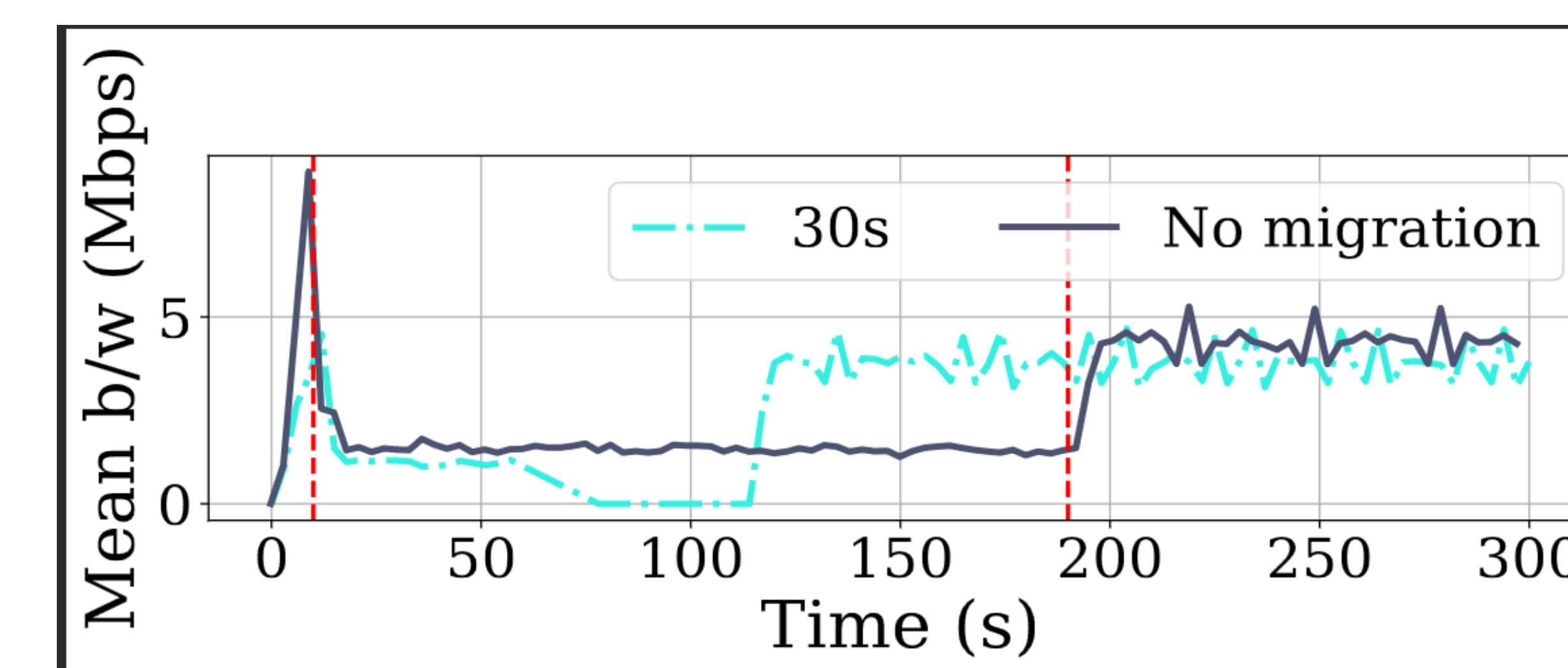
Proposed Solution

- Build a bandwidth aware orchestrator
- Should accept an application's CPU, memory and bandwidth needs
- Deploy and manage the applications on the wireless mesh



Evaluations

- Deploy applications on an emulated mesh using bandwidth aware orchestrator
- Measure performance of video conferencing application in terms of bandwidth received by each participant
- Bandwidth aware scheduler is able to detect and recover from bandwidth fluctuations faster than waiting for the situation to resolve



Future Work

- Continue deployment of routers on campus to understand performance of wireless mesh under different weather and load conditions
- Re-engage with community partners with the help of Councilman C.T. Martin

References

- [1] <https://www.pewresearch.org/fact-tank/2021/10/01/what-we-know-about-online-learning-and-the-homework-gap-amid-the-pandemic/>
- [2] <https://www.zipdatamaps.com/30314>