

GOALS

- **Repeat** and **Reproduce** past experiments
- **Adapt Offline Experimentation (OE)** approach for Fed4FIRE+
 - Capture traces of **link quality** and **node positions**
 - Reproduce conditions of past experiments using **Trace-Based ns-3 Simulations**
- **Validate OE approach** using **NITOS** and **w-iLab.t**
- **Promote interaction** between experimentation and simulation

CHALLENGES

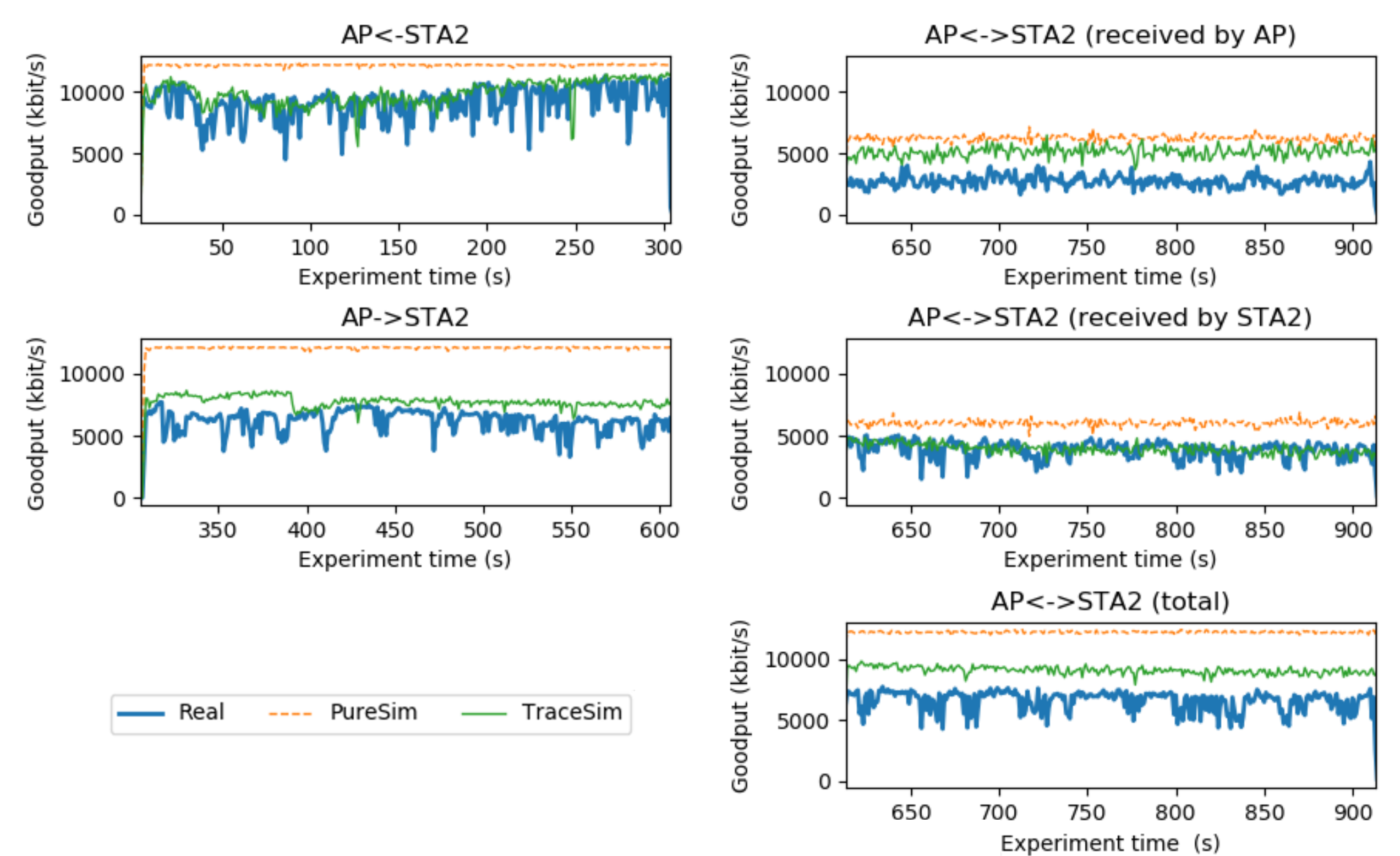
- Which **traces to capture** and how to capture them?
 - RSSI, Noise Floor, Position, Experiment Settings
- Which comparisons to perform between **Real experiments**, **TraceSim** and **PureSim** to validate OE approach?
 - Goodput, PHY Rate, Packet Loss Ratio, Delay
- How to **automatically capture traces** and **generate Trace-Based ns-3 simulations**?
 - User-friendly Framework supporting OE approach

DEMO SETUP

- **Zotac** Wi-Fi nodes from **w-iLab.t2**
- **Scenarios:** Point-to-Point and Multiple Access; Mobile and Fixed; Auto and Fixed Rate
- **Different link qualities** using 1 AP and 3 STAs
 - **Real link distance:** 6, 12 and 18 m
 - **TX-Power:** 1, 5, 9, 13 and 17 dBm
- **Traffic generation**
 - **Offered load above link capacity**
 - **UDP flows**
 1. AP \leftarrow STA_i
 2. AP \rightarrow STA_i
 3. AP \leftrightarrow STA_i

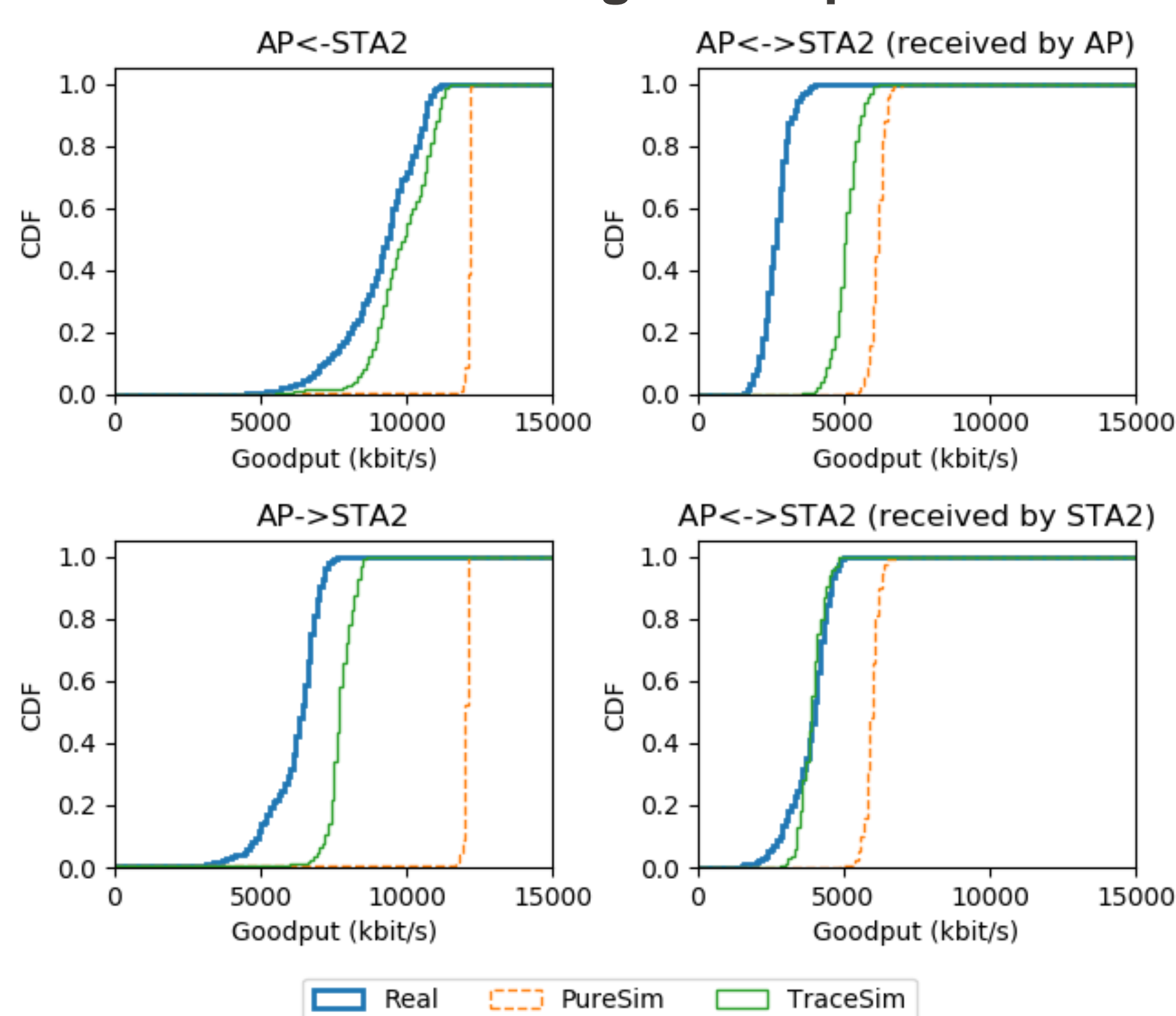
RESULTS

Average Goodput – P2P link A \leftrightarrow C @ 1 dBm



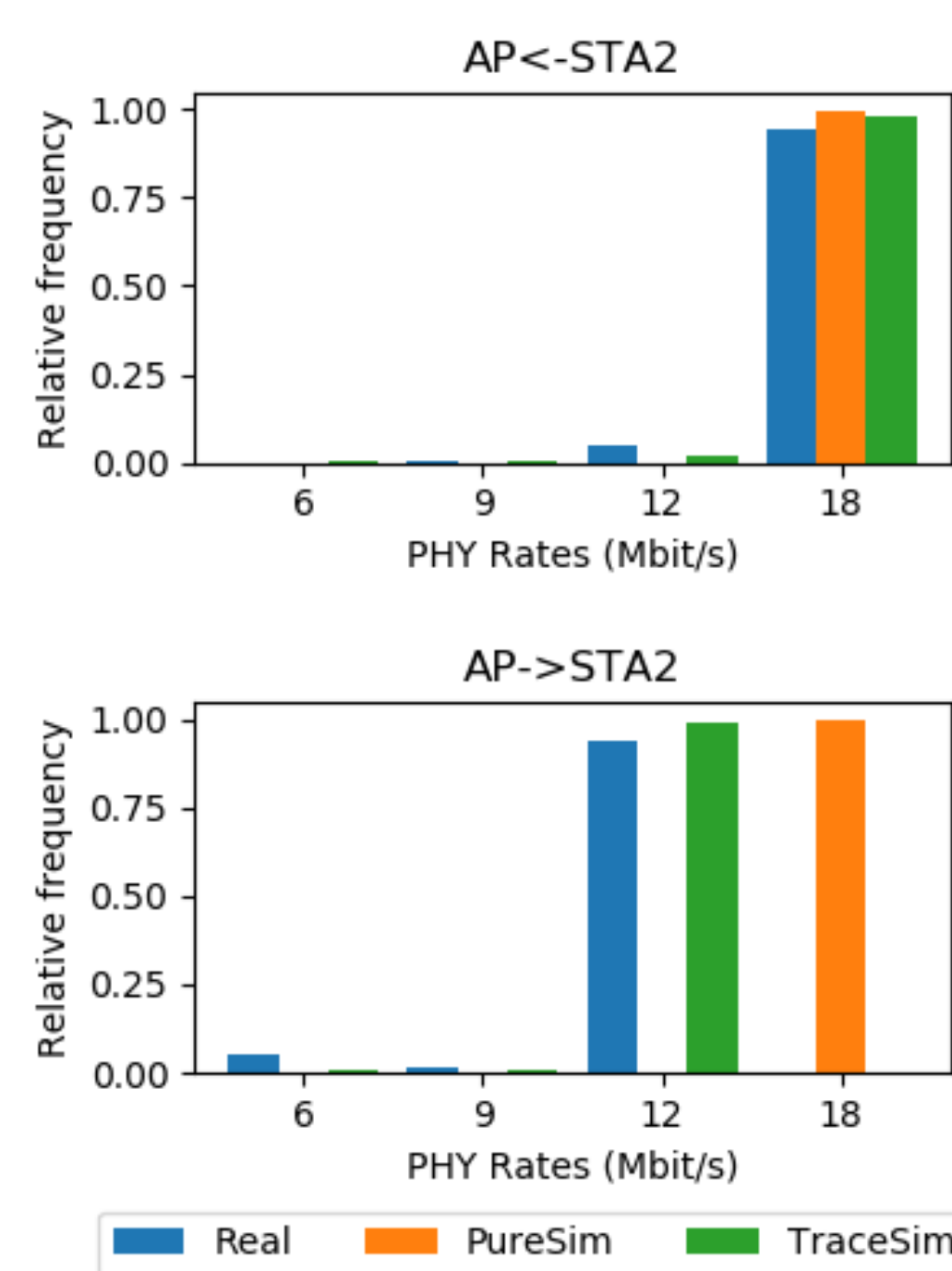
MORE RESULTS

CDF Average Goodput

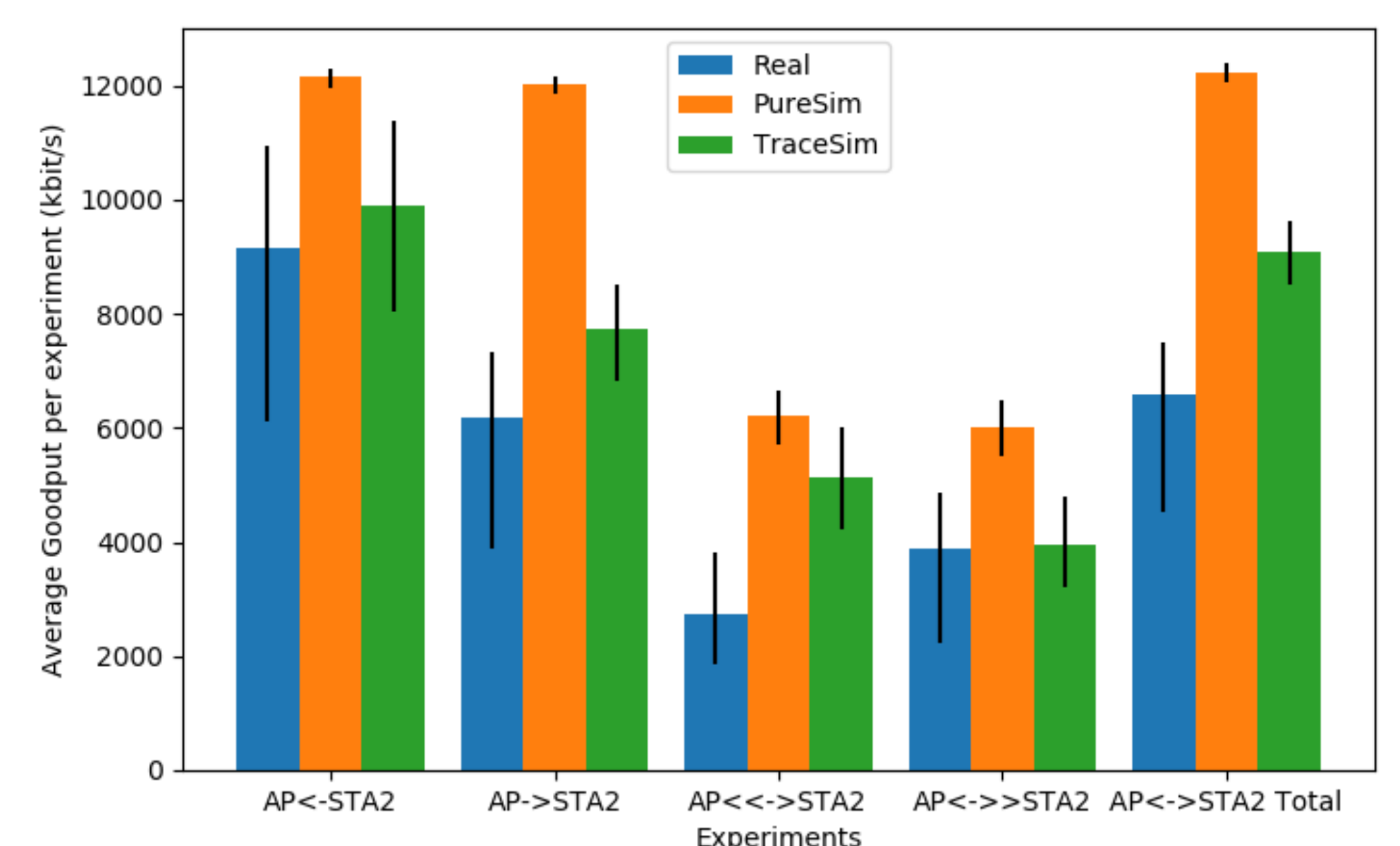


P2P link AP \leftrightarrow STA₂ @ 1 dBm

PHY Link Rates



Avg Goodput per experiment (95% CI)



CONCLUSIONS

- **TraceSim** results are **closer to Real** than **PureSim**
 - OE approach uses **one SNR sample per real packet** received
 - **Auto rate and Asymmetric link quality** reproduced by **TraceSim**
- **Framework to support OE approach**
 - **Reduces number of steps** needed and possible **human error**
 - **Automates** most complex and time consuming tasks
 - **Allows sharing** physical conditions of past experiments
 - **Generates automatic ns-3 scenarios** reproducing past conditions

FUTURE WORK

- **Conclude second part** of the proposed experiments
- Run experiments on **NITOS** testbed
- Publish **Journal paper**
- **Keep improving OE approach**
 - Add **MIMO support**
 - Automatically **adapt/fine-tune propagation loss models**
- Make **Framework to support OE approach** available