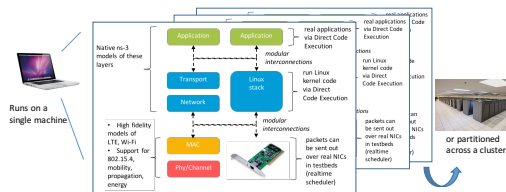


# ns-3 Network Simulation for Next-Generation Wireless

PI (University of Washington): **Sumit Roy (2020-2023), Tom Henderson (current)**  
PI (Georgia Tech): **Douglas Blough**

## ns-3 network simulator



- Models the **performance of networks**, with emphasis on **Wi-Fi**, **cellular**, and **Internet** technology
- Used throughout academia, government, and industry
- Collaborative open-source project** with many international contributors
- Prior NSF CRI Awards to UW:
  - CNS-0551686 (2006-10)
  - CNS-0958139 (2010-15)

## Team and Collaborators

**University of Washington**  
Sumit Roy  
Tom Henderson  
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Hao Yin  
Liu Cao  
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**Georgia Tech**  
Doug Blough  
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Brian Swenson  
Yuchen Liu  
Jingyuan Zhang

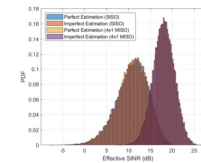
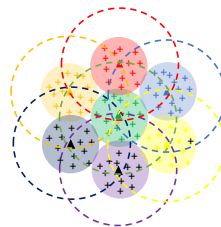
**Collaborators:** NIST (Richard Rouil), ns-3 Wi-Fi Industry Working Group, Huazhong University (Xiaojun Hei, Yayu Gao)

## Challenges Addressed

- Rapid pace of networking technology evolution
  - Wireless networks are becoming more **dense**, **heterogeneous**, and use **higher data rates**
- ↓
- New approaches for efficient simulation needed

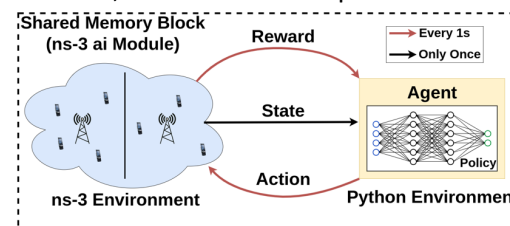
## UW Enhancements

- PHY/MAC abstractions for dense Wi-Fi networks on IEEE TGax-based scenarios
- Advanced link-to-system mapping for efficient sims



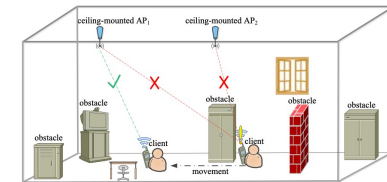
- POWDER testbed alignment (future work)

- Machine Learning (DRL) integration via ns3-ai module for future, at-scale network optimization research



## GT Enhancements

- Scalable mmWave simulations



- Obstacle modeling for LoS/NLoS determination
- Distributed simulation for indoor mmWave scenario
- Proactive scheduling for mmWave LAN
- CSI exchange protocol
- Mobility prediction
- Refactoring of IMDEA WiGig module to align with ns-3 Wi-Fi

## Sustainment Activities

- Publishing three ns-3 releases/year
- Organizing annual Workshop on ns-3
- Offered conference training/tutorials on ns-3 Wi-Fi and 5G NR modules
- Chairing the ns-3 Consortium Advisory Board and participating in the ns-3 Wi-Fi Working Group (with industry)