Contact us

Colosseum is operated by the Institute for the Wireless Internet of Things (W-IoT) at Northeastern University, and housed at the Northeastern Innovation Campus in Burlington, MA.

For information about
availability, capabilities, and pricing
please contact
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About Northeastern

Founded in 1898, Northeastern is a global research university and the recognized leader in lifelong learning powered by experience.

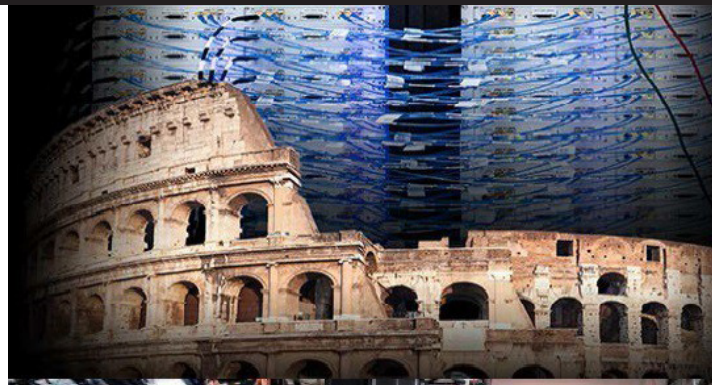
Our world-renowned experiential approach empowers our students, faculty, alumni, and partners to create impact far beyond the confines of discipline, degree, and campus.

Our locations — in Boston; the Massachusetts communities of Burlington and Nahant; Charlotte, North Carolina; the San Francisco Bay Area; Seattle; London; Toronto; and Vancouver — are nodes in a growing global university system that expands opportunities for collaborative, solutions-focused research and flexible, student-centered, lifelong learning.

Northeastern's comprehensive array of undergraduate and graduate programs — on campus, online, and in hybrid formats — lead to degrees through the doctorate in nine colleges and schools. Among these, we offer more than 140 multidisciplinary majors and degrees designed to prepare students for purposeful lives and careers.

Northeastern University

Colosseum at Northeastern University



Institute for the Wireless Internet of Things at Northeastern

Approved for Public Release, Distribution Unlimited

About Colosseum

Colosseum is the world's largest radio frequency channel emulator.

Originally developed to support DARPA's Spectrum Collaboration Challenge (SC2), Colosseum will move to Northeastern University in October 2019, and be available in the spring of 2020 to serve a number of stakeholders, including US academic researchers, R&D groups from US industry, as well as DoD researchers and their contractors. It will be operated and integrated with the National Science Foundation (NSF) Platforms for Advanced Wireless Research (PAWR) program so that the same experiment can be run in a controlled environment on Colosseum, and then "in the wild" on a PAWR platform.

An investment by DARPA of tens of millions of dollars, Colosseum is a massive RF and computational facility that emulates wireless signals (with granularity at the RF signal level) traversing space and reflecting off multiple objects and obstacles as they travel from transmitters to receivers. Allowing 256 x 256 100 MHz RF channel emulations, with USRP X310 radio nodes in the loop interacting in over 65,000+ channels at the same time, Colosseum can create virtual worlds, as if the radios are operating in an open field, urban area, shopping mall, or a desert, by generating more than 52 terabytes of data per second. Colosseum enables full stack wireless networking research from applications down to the physical layer at scale - with up to 256 interacting radios.

Platforms for Advanced Wireless Research

NSF

DARPA

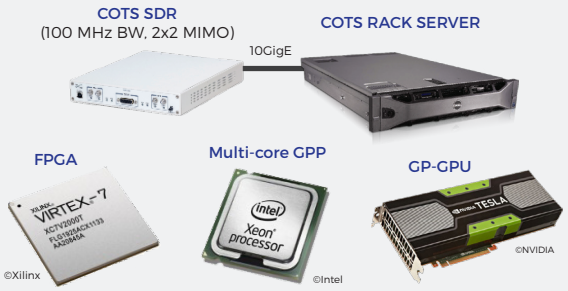
Specifications

At its core, Colosseum is a specialized data center with a significant amount of hardware. It has:

- 900 TB of Network Attached Storage (NAS)
- 171 high-performance servers
- 256 USRP X310s (128 as communications devices, 128 as part of the channel emulator)
- 18 10G switches
- 19 clock distribution systems
- 25.6 GHz total instantaneous bandwidth
- 52 TB/s of digital RF data
- 320 FPGAs
- Hundreds of high-speed optical connections
- Software-based traffic generation solutions hosted on a pool of dedicated servers
- Full-mesh networking capability
- 21 racks of radios, FPGAs, servers and support equipment

Remotely Accessible

- Operates 24x7x365
- Jobs are scheduled using a simple web interface
- Users may operate interactively or schedule batch jobs
- Users are allocated storage for results collection and processing



Operations

As an RF Testbed:

- Emulate multiple operational environments including a 1 sq. km open field, a dense urban city, a suburban shopping mall, a desert, or anything in-between
- Emulate in realtime multipath and fading effects with high-fidelity ray-tracing
- Support high-fidelity and large-scale research on waveforms, protocols at all layers, networked applications, jamming and security, MIMO, and beamforming
- Provide full-stack repeatable environment (from RF to application layer)
- Allow for large scale testing, up to 256 radio nodes
- Support cellular networks (4G, 5G), IoT, spectrum sharing, cognitive radio, ad hoc networks, edge computing, and cloud RAN

As a Collaborative User Framework:

- Allow multiple teams to timeshare resources of the system to evaluate and debug their radio network designs using a large number of radio nodes
- Automate the execution of complex scripted scenarios involving multiple teams
- Visualize and quantify the impact of decisions, actions, effects and performance of multiple radio networks interacting in realtime