NS-3 Consortium Annual Meeting

NS-3 Annual Meeting
June 24, 2022

Agenda

- Consortium overview
  - History, structure, membership, budget
  - Advisory Board
  - Recent activities and future plans
  - Q&A about the consortium
- Open source project status and discussion
  - Summary of recent project activity
  - Q&A/discussion about the open source project

WNS3 acknowledgments

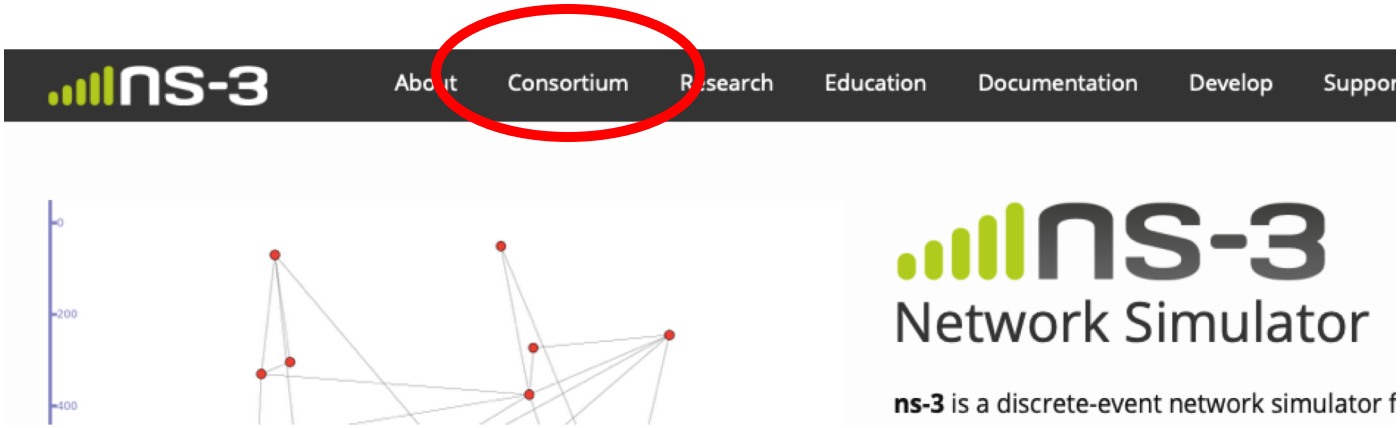
- Thanks to Michele Polese, Yuchen Liu, and Eric Gamess, and our TPC, for WNS3 2022
  - No significant issues arose during WNS3 review process
  - Michele is completing a two-year term
- Thanks to tutorial leads Biljana Bojovic, Zoraze Ali, and Evan Black
- Hackathon: Tommaso Pecorella and Evan Black (MR !998)

Technical Program Committee Members	
Ramon Aguero	University of Cantabria – Spain
Hany Assasa	Pharrowtech – Belgium
Stefano Avallone	University of Naples Federico II – Italy
Peter Barnes	Lawrence Livermore National Laboratory – USA
Doug Blough	Georgia Institute of Technology – USA
Federico Chiariotti	Aalborg University – Denmark
Sébastien Deronne	Televic Conference – Belgium
Helder Fontes	University of Porto – Portugal
Eric Gamess	Jacksonville State University – USA
Felipe Gomez-Cuba	University of Vigo – Spain
Thomas Henderson	University of Washington – USA
Pasquale Imputato	University of Naples Federico II – Italy
Anil Jangam	Cisco Systems – USA
Dong Jin	Illinois Institute of Technology – USA
Junseok Kim	Samsung Electronics – South Korea
Sandra Lagen	Centre Tecnològic de Telecomunicacions de Catalunya – Spain
Leonardo Lanante	Kyushu Institute of Technology – Japan
Davide Magrin	University of Naples Federico II – Italy
Spyridon Mastorakis	University of Nebraska Omaha – USA
Vedran Miletić	Heidelberg Institute for Theoretical Studies – Germany
Mohit Tahiliani	National Institute of Technology Karnataka – India
Hajime Tazaki	IIJ Innovation Institute – Japan
Thierry Turletti	Inria – France
Tommaso Zugno	University of Padova – Italy

2022 WNS3 TPC

About the ns-3 Consortium

- Sustainment organization for the open source project
  - Officially organized as a University of Washington program
- Functions:
  - Handle funding and provide infrastructure for the project
  - Organize an annual workshop and meeting
  - Provide an interface for industrial and academic members to contribute and interact with the open source project



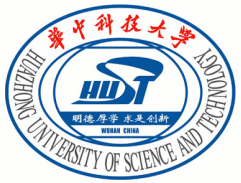
Current membership

- Founding Executive Members

- Executive Members

National Institute of Technology
Karnataka, Surathkal

- Members



Classes of Consortium Members

- Class I Consortium Members:
  - For-profit entities with more than 500 employees
  - Annual Dues: $15,000
- Class II Consortium Members:
  - For-profit entities with 20 or more and less than 500 employees
  - Annual Dues: $7,500
- Class III Consortium Members:
  - For-profit entities with less than 20 employees
  - Annual Dues: $1,500
- Class IV Consortium Members:
  - Non-Profit Organizations, governmental organizations, and U.S. Federally Funded Research and Development Centers (FFRDCs)
  - Annual Dues: $1,500

Current Advisory Board

- Tom Henderson (Director, University of Washington)
- Sumit Roy (Associate Director, University of Washington)
- Walid Dabbous (INRIA)
- Sandra Lagen (CTTC)
- Manuel Ricardo (INESC TEC)
- Doug Blough (Georgia Institute of Technology)
- Mohit Tahiliani (NITK Surathkal)
- Xiaojun Hei (Huazhong University of Science and Technology)
- Greg White (CableLabs)

Member activities and interests

Brief overview of the technical agenda for Advisory Board members

- University of Washington
- INRIA
- Georgia Tech
- CableLabs
- INESC TEC
- HUST
- CTTC
- NITK Surathkal

2021-22 meetings

- All meeting minutes posted on the main ns-3 web server
  - Sept. 29, 2021: WNS3 2022 planning, WiGig software work, member updates on activities
  - Feb. 8, 2022: WNS3 2022/23 planning, WiGig software work
  - Apr. 1, 2022: OMNeT++ vs. ns-3 for simulating industrial networks, INRIA plans for the EU SLICES program

Budget status

- Consortium raises small amounts of funding to pay for annual meeting, low-cost infrastructure/services, and software development
- Income sources
  - Consortium membership fees
  - WNS3 registration fees (usually set low, to cover costs)
- Consortium accounts currently hold roughly $9,000 (through June 2022)
  - After current obligations, $7,000 remaining

Current activities

- Contracted software development
  - Refactoring of wifi module to allow WiGig module to exist in a separate module
  - Work performed by Sebastien Deronne
  - Technical reports available at: https://www.nsnam.org/consortium/activities/software/
- Training
  - Wi-Fi overview (Tom Henderson and Hao Yin), ACMSE Conference, 2022
  - Past annual meetings (through 2019) offered two days of basic (and advanced topic) training

Other Consortium expenditures

- Hardware and software infrastructure
  - Vimeo subscription for ad-free video hosting
  - Virtual machine software for Jenkins test infrastructure
  - Workstations at University of Washington (in past years)
  - Website design/maintenance (in past years)
- ACM Digital Library fees for WNS3
- Travel support to annual meeting (in past years)

Consortium next steps

- Discussing return of in-person meeting in 2023
  - Washington DC is being considered
- Tutorial/educational improvements and online (updated) basic training

Questions?

Open source project status

Open source project highlights

- Two releases (ns-3.35, ns-3.36) since last June
- Three students in Google Summer of Code 2021 completed projects in September
- Google Summer of Code 2022 awarded us three students
  - **Org. admins:** Tommaso Pecorella, Mohit Tahiliani
  - **Mentors:** Mohit Tahiliani, Bhaskar Kataria, Vivek Jain, Sandra Lagen, Biljana Bojovic, Michele Polese, Tommaso Pecorella, Ameya Deshpande, and Manoj Kumar Rana
  - One supplemental ns-3 summer of code (NSOC) program
  - Details available at https://www.nsnam.org/wiki/Summer_Projects

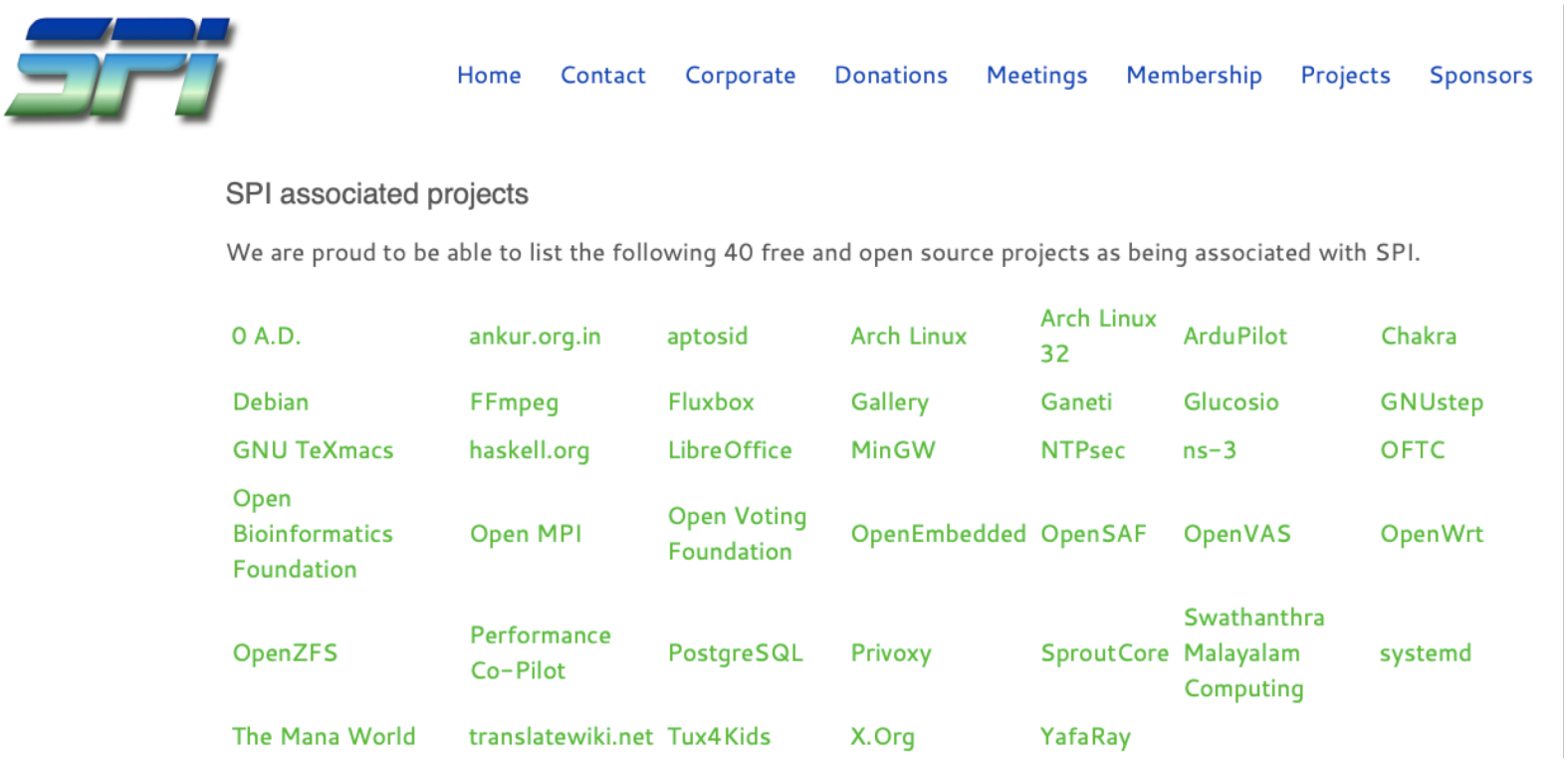
Code statistics and maintainer commits

Since last annual meeting (June 19, 2021)

- **176 commits** by **39 authors**
- **Maintainer commits** from
  - Alexander Krotov, **Ameya Deshpande**, Biljana Bojovic, **Gabriel Ferreira**, Mohit Tahiliani, Peter Barnes, **Sandra Lagen,** Sebastien Deronne, Stefano Avallone, Tom Henderson, Tommaso Pecorella, Zoraze Ali
- **159,000 lines** of C++ code added/deleted (ns-3-dev)
  - parsed output of git diff --stat filtered for .{cc,h}
  - 114,000 lines due to wifi module and wireless examples
- **330 Merge Requests** opened
- **196 Issues** filed

Software in the Public Interest (SPI)

- ns-3 also joined the SPI umbrella organization in 2020 (https://www.spi-inc.org)
  - Current budget balance $1140



Funded project priorities

- Scalable wireless simulations (NSF Award, University of Washington and Georgia Tech)
- Wi-Fi 7 models (802.11be aspects)
- NR V2X-based public safety models and scenarios

Technical progress summary

- Wi-Fi and 5G cellular models continue to develop at a rapid pace
- IoT-related contributions are heating up
- CMake build system replaced Waf
- Making use of GitLab.com CI system
- Software cleanup and C++ evolution
- NetSimulyzer progress

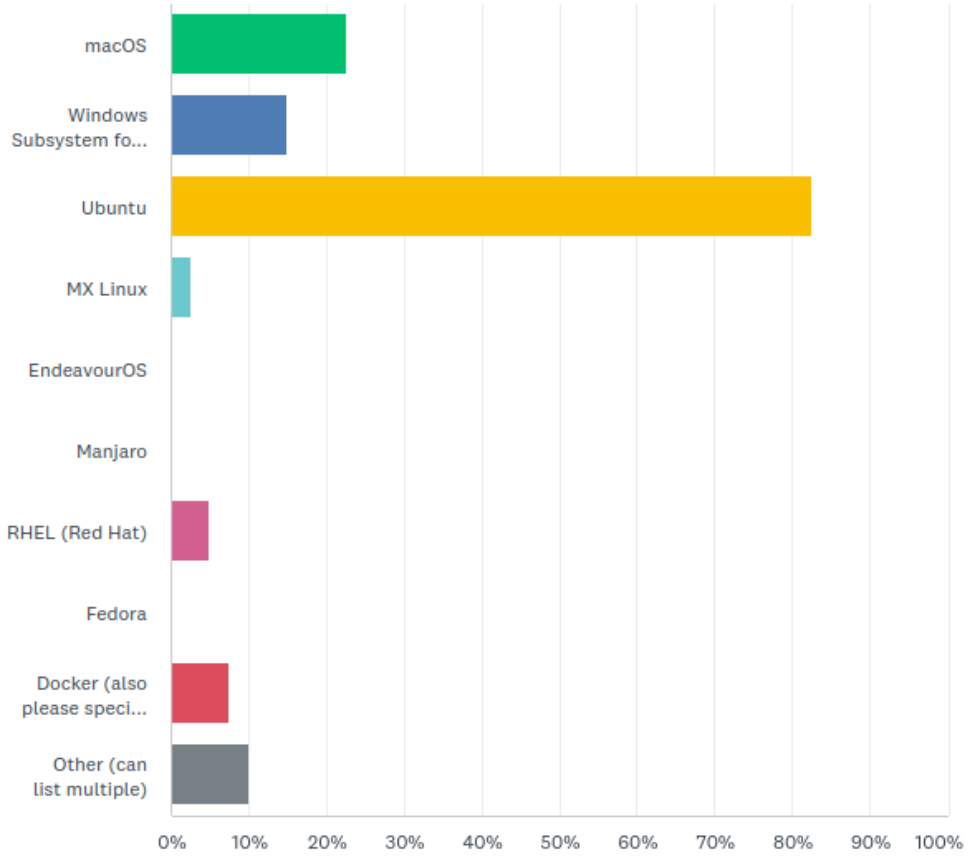
Areas of concern

- Tutorial and examples could use modernization and cleanup
  - Overall ease of use improvements
  - More hands-on opportunities for tutorials/training
  - Technology-specific tutorials
- App store contributions and maintenance have dropped off
- Python bindings are no longer supported
  - cppyy integration is a work in progress
- Emulation is not being tested or improved upon
- We ought to define how ns-3 should be packaged by others
- Managing the incoming workflow of patches and issues

Results of small survey of OS

- Recent survey responses (40 users)

Answered: 40 Skipped: 0



Near term goals (Tom)

- DCE 1.12/1.13 releases (modern Linux kernel)-- with Parth
- Better Windows support-- Gabriel
- Installation guides (move from wiki to Sphinx documentation)
- Reorganize ns-3-allinone release (see next slide)
- Migrate one or more modules to the app store (wimax, others...)
- Rework tutorial and examples-- with Mohit, Doug, others?...
- Automate our style checking/linting-- Eduardo
- Python bindings via cppyy? *(volunteer needed)*
- Otherwise... work on tracker issues and incoming MRs

Antoine de Saint-Exupéry: 'A goal without a plan is just a wish.'

ns-3-allinone reorganization

- ns-3-allinone was carried over from ns-2-allinone
- Historically, has contained some build scripts, ‘bake’ build system, ‘pybindgen’, ‘netanim’, and ‘nsc’
- Possible option:
  - Some time (~1 month) after publishing ns-3.x release, publish ns-allinone-3.x release
  - Include all compatible modules from the app store in the contrib/ directory
  - Replace build.py and dist.py with bake.py
  - Bundle selected third party tools/libraries of high community interest (netsimulyzer, netanim)
  - Ensure bake compatibility with other libraries (e.g. ns-3-dce components)

Summary

- Thanks to all who have built and continue to care for ns-3
- Maintenance help will always be needed and appreciated
  - Great job by a small maintainer team in the past year
  - Nice to see many new contributors this year
- Consortium members wanted
  - Funding and industrial participation is needed for sustainment
  - Email: consortium@nsnam.org
- Apps wanted
  - Help us populate the app store (https://apps.nsnam.org)

Questions or comments about the consortium or open source project?