

**NS-3 Consortium**  
**2015 Annual Operational and Financial Report**

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# 1. Introduction

In accordance with Article 3 of the NS-3 Consortium Establishment Agreement, the Steering Committee is chartered with producing an annual operational and financial report with a brief scientific and technical overview. This report constitutes the annual report for 2015.

This report is organized as follows:

- Section 2 describes the purpose and general objectives of the NS-3 Consortium.
- Section 3 lists the consortium members and committee composition for 2015.
- Section 4 summarizes the 2015 meetings of the NS-3 Consortium.
- Section 5 provides a brief technical overview of the activities of the open source ns-3 project.
- Section 6 provides the annual financial report of the Consortium.
- Section 7 lists future plans for the Consortium.

## 2. Purpose and General Organization of the NS-3 Consortium

The NS-3 Consortium was established in its present form in October 2012, by two founding members: the University of Washington and INRIA. The Consortium was established to provide a long-running organization to support the open source ns-3 network simulator project. This support comes in two primary forms:

- 1) an organization to raise and manage funding needed to operate the open source project
- 2) a steering committee to assist in operational and logistical functions in support of the open source project

The Consortium operates according to the rules documented in the NS-3 Consortium Establishment Agreement formed by the University of Washington and INRIA. The organization structure is loosely patterned after other consortia previously formed by both institutions, and drawing also from other open source foundations and consortia supporting other open source projects.

Membership is composed of institutions that have some kind of interest in maintaining and developing the ns-3 network simulator. Membership is one way that an organization can financially or operationally support the project. There are two main tiers of membership: 1) Executive Members, who provide management, and 2) regular Consortium Members, who pay annual dues and who can participate in annual Consortium activities.

The Steering Committee is the main operational body within the consortium, and is responsible for the following main duties (Article 3 of the Consortium Establishment Agreement documents some additional duties):

- making recommendations on how the Consortium's funds shall be expended, accordingly with its objectives (organization of training courses, workshops, etc.),
- organizing events in relation to the NS-3 Consortium,
- accepting new members,
- submitting suggestions made by Consortium Members to ns-3 maintainers.

The Steering Committee is composed of representatives of its Executive Members. The Steering Committee is chaired by an Executive Director who is appointed annually by the Steering Committee.

Further details are available in the NS-3 Consortium Establishment Agreement document, available online at <http://www.nsnam.org/consortium>.

### 3. Membership

There were no organizational membership or leadership changes during 2015. The Steering Committee, at the end of 2015, consists of:

- Lorenza Giupponi (CTTC) (replacing Nicola Baldo, CTTC)
- Marc Barret (INRIA)
- Mike Clarke (University of Washington)
- Walid Dabbous (INRIA)
- Gerard Giraudon (INRIA)
- Tom Henderson (University of Washington)
- L. Felipe Perrone (Bucknell University)
- Manuel Ricardo (INESC Porto)
- George Riley (Georgia Institute of Technology)
- Sumit Roy (University of Washington)

Tom Henderson continued to serve as Executive Director in 2015.

In July 2013, Lawrence Livermore National Laboratory (United States) joined as a regular Consortium Member, and at the end of 2015, continues to be the only such member.

## 4. Meetings

The steering committee met three times (by telecon in January and October, and at the annual meeting in May) in 2015. Detailed meeting notes are available on the main ns-3 web server.

The first meeting on January 23, 2015 accomplished the following:

- approval of 2014 operational/financial report, and posting of the report and steering committee meeting minutes to the project website; and
- planning for the annual Workshop on ns-3 at CTTC in May, including planning for ns-3 training and management of projected costs and revenue from the event.

The ns-3 Consortium Annual Meeting was hosted by CTTC, near Barcelona, on May 14, 2015, and attended by five steering committee members and various other attendees from the Workshop on ns-3. The agenda of the meeting was to review the goals of the consortium, review 2014-15 activities, and discuss next steps. The meeting was open to all interested participants. Tom Henderson presented a set of overview slides, and discussion was held on selected topics:

- funding for sustainment (software maintenance) activities, since industrial participation in the Consortium has not materialized as a source of sufficient revenue;
- publicly posting the videos recorded in the ns-3 training session;
- planning for future WNS3 meetings;
- guidelines for reviewers of WNS3 submissions; and
- how to recruit new software maintainers, and what to do with unmaintained modules.

On October 21, 2015 the steering committee held a telecon to discuss these items:

- planning for future ns-3 annual meetings, including selection of new co-chair of TPC, reconfirming the proceedings chair, adjustments to the call for papers, and travel stipends;
- Lorenza Giupponi was asked to serve as CTTC's representative, replacing Nicola Baldo
- receipt of an application for membership from NITK Surathkal
- WNS3 budget and plans for future changes to registrations

## 5. Technical Overview of 2015 Activities

This section provides a brief overview of 2015 activities of the open source ns-3 project. The NS-3 Consortium did not directly fund any of these activities; if it were to fund activities in future years, based on Consortium funds, those results would be reported in this section of the annual report.

The main activities were the three scheduled software releases of ns-3, ns-3.22, ns-3.23 and ns-3.24, including new model features and bug fixes. In general, the project makes roughly three software releases per year.

ns-3.22, released on 5 February, provided a number of updates related to WiFi support, including MPDU aggregation for WiFi, and new WiFi rate controls. Related to WiFi, the WAVE module (for vehicular networks) added the channel-access coordination features of IEEE 1609.4, and also a comprehensive VANET routing example that includes a Basic Safety Message (BSM) packet generator. Regarding LTE models, in previous releases, the bearer release functionality was only partially supported; a complete release bearer procedure is now implemented.

ns-3.23 was released on 14 May in coordination with DCE version 1.6 and netanim-3.106. The release includes a television transmitter (interference) model, support for geographic to cartesian coordinate conversion, updates to the mesh module to make it more standards-conformant, and several Wi-Fi enhancements mainly related to 802.11n models. The DCE 1.6 version includes a bug fix (Bug 2015) and an internal API update for the Linux kernel (i.e., libsim-linux.so). netanim-3.106 adds support for Qt 5 with gcc (tested up to Qt 5.4). This netanim release also makes an enhancement to the detection of invalid trace files, and for nodes that are rendered with images, the image is now centered on the node's underlying coordinate.

ns-3.24 was released on 15 September 2015. The main new model extension for this release is the addition of 802.11ac Very High Throughput (VHT) physical layer modes for Wi-Fi. This release also includes updates to the Waf build system and initial support for Python 3. The IPv4 ARP cache now supports the manual removal of entries and the addition of permanent entries. The SimpleChannel in the 'network' module now allows per-NetDevice blacklists, in order to support hidden terminal testcases.

The project mentored four summer students in 2014 as part of the Google Summer of Code program. The project participated with one student in the European Space Agency "Summer of Code in Space" project, but the project did not complete successfully. ns-3 has participated in Google Summer of Code in every year but one since 2008.

## 6. Financial Report

The Consortium funds are presently maintained by the University of Washington.

At the start of 2015, the ns-3 Consortium gift account held \$6983.69 and a second account that incurs 20% institutional overhead (membership dues) held \$1500.00, of which \$1250.00 is available to the consortium.

The following income was received in 2015:

- All Google Summer of Code mentors agreed to donate the “mentor stipends” received from Google (\$500 for each student project) to the Consortium, for a total of \$2000;
- The consortium received a gross income of roughly \$3400 from registration fees for WNS3 training and attendance;
- The consortium received a renewal of membership (\$1500) from LLNL, bringing the total in the dues account to \$3000.

The following expenses were incurred in 2015:

- Beverage/food costs for WNS3 (~\$1500);
- Travel stipends and reimbursements for WNS3 (~\$4500);
- ACM ICPS publishing fee (\$500);
- Purchases for the May 2015 annual meeting (~\$400);
- Project shirts and postage fees for 2015 summer students and mentors (~\$300);
- Fees for handling workshop payments (~\$100);

At the end of 2015, the accounts at the University of Washington have the following balances:

- 1) the Consortium dues account contains \$3000.00, of which \$2500.00 is available for spending.
- 2) the Consortium gift account contains \$5028.55.

## 7. Future Plans

In 2016, the Consortium plans to hold a similar, week-long event in Seattle in June (the week of 13-17 June), hosted by University of Washington. The first two days will consist of user training, requiring paid registration for all. Proceeds from the registration fees will be donated to the Consortium. The eighth annual Workshop on ns-3 will be held on the third and fourth days (Wednesday June 15 to Thursday June 16). The fourth day will also hold the ns-3 Consortium annual meeting. On the fifth day, a special workshop on wireless network performance evaluation is planned (and will have a separate budget).

Finally, a key goal of the open source project for 2016 is to further modularize the codebase. This is to allow a more federated development and software maintenance model that does not require that all models be merged into the main ns-3 source tree. The current list of models under development and undergoing code review is maintained on the "Current Development" wiki page, or on the release wiki pages, on the ns-3 wiki.