NS-3 Consortium
2013 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 2013.

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 2013.

- Section 4 summarizes the 2013 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

At the beginning of 2013, the University of Washington and INRIA, as Founding Executive Members, were the sole members of the consortium. In early 2013, they decided to expand the Executive Membership to provide additional representation on the Steering Committee, and decided to invite two additional organizations from North America (Georgia Institute of Technology and Bucknell University) and two from Europe (INESC Porto and CTTC) as executive members. All four institutions accepted the invitation and completed the membership agreement process in 2013.

The Steering Committee, at the end of 2013, includes:

- 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 served as Executive Director in 2013 and was reappointed to another annual term in November 2013.

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

4. Meetings

The Consortium met three times in 2013. The first meeting was the inaugural annual plenary meeting, hosted by INRIA in Sophia Antipolis, France, on March 4 2013, and attended by roughly 40 people. This meeting featured a plenary introduction talk by Tom Henderson and Walid Dabbous, outlining the goals of the consortium, and then two parallel tracks were conducted for the remainder of the day. The first track was a beginner's tutorial for newcomers to the project. The second was a series of advanced tutorials on special topics, including the following topics:

- A Technical Overview of the ns-3 LTE module by the LENA project (Nicola Baldo)

- Direct Code Execution with ns-3 (Mathieu Lacage and Hajime Tazaki)

- Network Experimentation Programming Interface (NEPI) (Alina Quereilhac)

- Visualization and Data Collection (Felipe Perrone and Tom Henderson)

Following the meeting, on March 5, some members of the Steering Committee held a face-to-face meeting also with ns-3 maintainers (during developer discussions). The following two topics were discussed the most extensively:

- incentives to industry membership, including specifically the potential to offer paid training courses to raise money

- whether the ns-3 Consortium should sponsor development of Microsoft Visual Studio support, also of interest to industry.

The Consortium held a telecon on September 26, attended by Nicola Baldo, Rui Campos, Tom Henderson, Felipe Perrone, Manuel Ricardo, and George Riley. The following topics were discussed:

- new memberships (Lawrence Livermore National Laboratory, Bucknell University, and Georgia Tech Research Corporation), and how to recruit additional membership,

- plans for the Workshop on ns-3 in 2014,

- plans for conducting training sessions prior to the workshop,

- project updates including the ns-3 Windows port status and the status of Google Summer of Code projects, and

- financial status and fund raising ideas.

The Consortium held a telecon on November 20, attended by Nicola Baldo, Walid Dabbous, Tom Henderson, Felipe Perrone, Manuel Ricardo, and George Riley. The following topics were discussed:

- The ns-3 consortium agreement calls for appointment of an Executive Director (position held by Tom Henderson since October 2012). The meeting consensus was to appoint Tom for another year, and perhaps discuss the rotation of the appointment after another year's time.
- The meeting again discussed how to prepare materials that clearly outline the benefit of joining

the consortium, for prospective new members.

- Overall project status (ns-3 release plans, summer student outcomes) were reviewed. The meeting discussed that there is still a segment of the research and educational community that is selecting ns-2 for new projects, perhaps still not knowing about ns-3's status. The discussion centered around the value of publishing a high visibility paper (such as a CCR submission) on ns-3, and more clearly organizing the ns-2 and ns-3 documentation to point out the differences and status.
- Planning for the proposed 2014 annual meeting and Workshop on ns-3, in Atlanta GA in May 2014, was reviewed. A Consortium event in Europe later in 2014 was discussed but no specific plans were made.

5. Technical Overview of 2013 Activities

This section provides a brief overview of 2013 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 key technical accomplishment in 2013 for ns-3 was the release of the Direct Code Execution (DCE) framework, and the associated "bake" build tool, both developed by INRIA. These were released at the same time as the ns-3.17 release (April 2013), one of three ns-3 new feature software releases made in 2013. Significant progress was made by the associated LENA project, developing LTE-related software for ns-3; in particular, the ns-3 LTE module was enhanced with the new MIMO, HARQ, Random Access, RRC, S1-AP, X2 and MME models that were included in the ns-3.17 release, and the UE Measurements and Handover models that were included in the ns-3.18 release.

Direct Code Execution (DCE) is a framework for compiling C- and C++-based software, with little to no source code modification, for execution within the ns-3 simulator. This is accomplished by a specialized build system and modified software loader. Example software that can be included with ns-3 include popular tools such as iperf, ping, and traceroute, routing software such as the quagga open source routing suite, and the Linux networking kernel. The bake build tool is the tool that orchestrates the building and linking of this external software with ns-3. Bake is also intended, in 2014, to provide the capability for modularizing and federating the ns-3 software itself, allowing the ns-3 core to shrink and enabling fine granularity by users to select and install only the protocol models of interest to their research.

One activity that was performed on behalf of the ns-3 Consortium by John Abraham and Brian Swenson (Georgia Tech) was the porting of ns-3 to the Microsoft Windows Visual Studio 2012 development environment. This was done to broaden the user base including use of ns-3 in educational settings, where many instructors and students use Microsoft Windows. This was announced to the ns-3 community in the fall of 2013.

The project mentored two summer students in 2013 as part of the Google Summer of Code program, and one student in the European Space Agency "Summer of Code in Space" project. 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. The following income was received in 2013:

- Guillaume Remy, Nicola Baldo, and Marco Miozzo donated their mentor stipends ($500 for each student project) to the Consortium;

- Lawrence Livermore National Laboratory joined as a regular Consortium member.

The following expenses were incurred in 2013:

- Gifts (project shirts, speaker gifts) for presentation at the March 2013 annual meeting;

- SSL certificate for the server www.nsnam.org;

- Student travel grant, granted to Vedran Miletic in 2013 for attending the ns-3 workshop.

7. Future Plans

In 2014, the Consortium is organizing a full week of activities for the project. Georgia Institute of Technology (Georgia Tech) is hosting the event on campus, during the week of May 5-9, 2014. The first two days will consist of user training, requiring paid registration for non-students. Proceeds from the registration fees will be donated to the Consortium. The sixth annual Workshop on ns-3 will be held on the third day (Wednesday May 7). The fourth and fifth days will be reserved for the ns-3 Consortium annual meeting, developer discussions, and coding and documentation work.

The Consortium will likely conduct training and other activities in Europe in 2014, at a date and site to be determined.

Finally, a key goal of the open source project for 2014 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 ns-3 source tree. Regarding model development, some models under current active development include IEEE 802.15.4 and IEEE 802.11n models. The current list of models under development and undergoing code review is maintained on the "Current Development" wiki page on the ns-3 wiki.