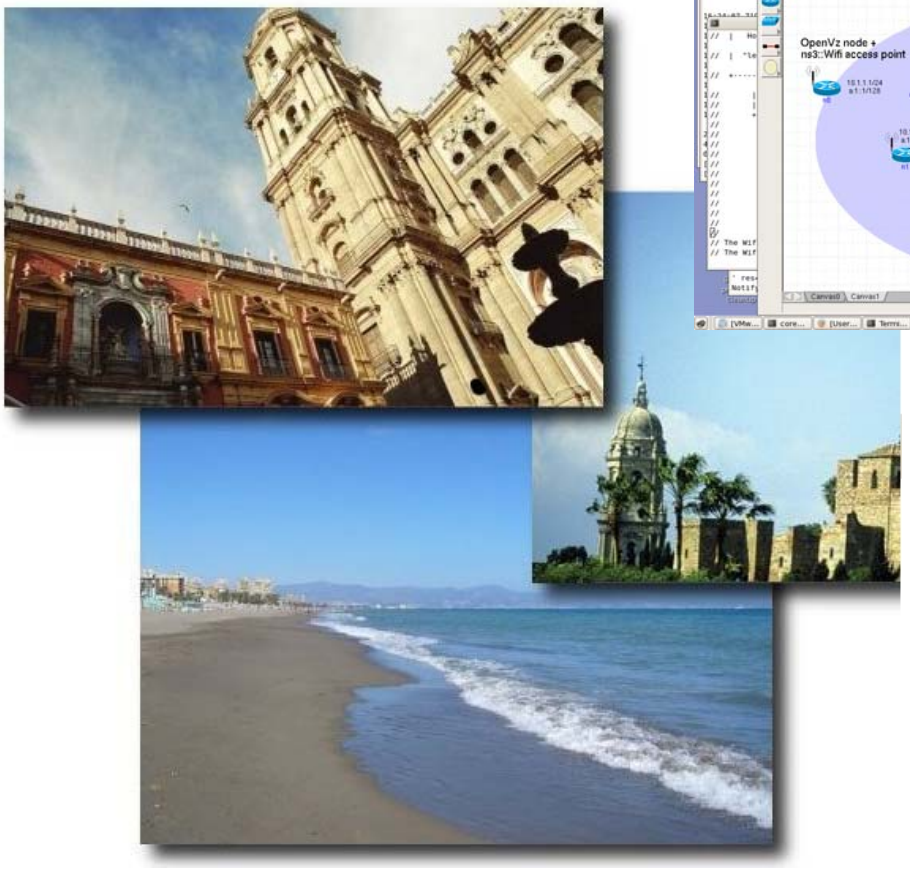
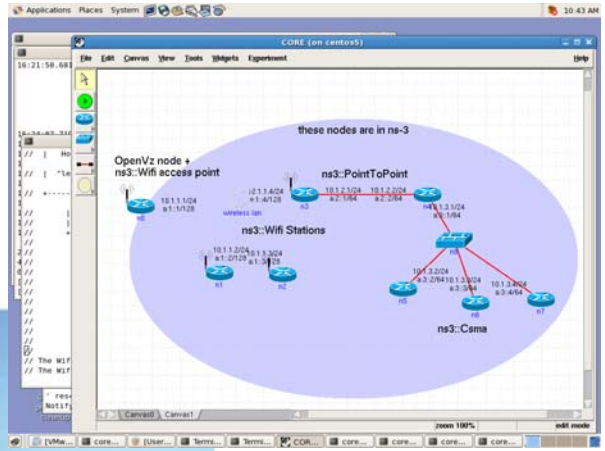
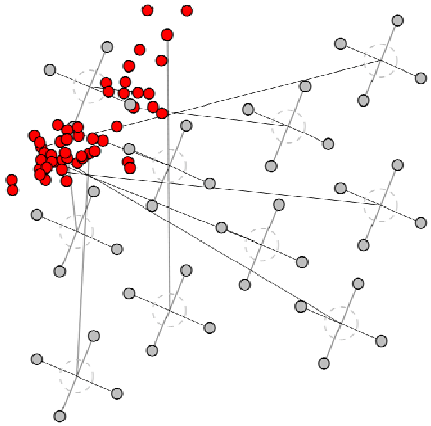
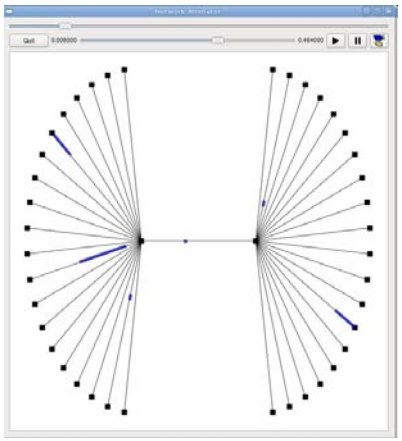
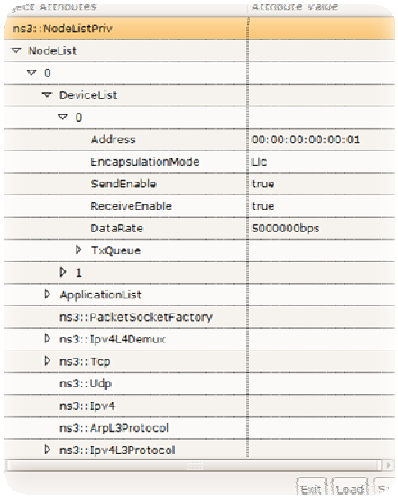
Workshop on ns-3











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Outline

- Introductions
- Agenda and logistics
- Progress since WNS3 2009
- Frameworks for ns-3
- Future plans

WNS3 agenda (Morning)

Technical Program

Schedule:

8h30-9h00: **Welcome, Agenda, Introductions, Project News**

9h00-10h30: **Frameworks Session 1: Workflows**

- 9h00-9h30: Felipe Perrone, "Automation frameworks for ns-3"
- 9h30-9h50: George Riley, "Animation and visualization"
- 9h50-10h10: Josh Pelkey, "Distributed simulations with MPI"
- 10h10-10h30: Discussion and related work

10h30-11h00: Coffee Break

11h00-12h30: **Frameworks Session 2: Emulation and real code**

- 11h00-11h20: Mathieu Lacage, "Application support in ns-3"
- 11h20-11h50: Hajime Tazaki, "Running code simulation with Zebra routing software"
- 11h50-12h10: Tom Henderson, "Containers and ns-3"
- 12h10-12h30: Tom Henderson, "The CORE Emulator and ns-3"

12h30-14h00: Lunch Break

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WNS3 Agenda (afternoon)

14h00-16h00: **Session 3: Wireless**

- 14h00-14h20: Hendrik vom Lehn, "A Wi-Fi Emulation Framework for ns-3"
- 14h20-14h40: Jens Mittag, "Validation of the IEEE 802.11 Wifi implementation for OFDM-based communication"
- 14h40-15h00: Nicola Baldo, "Validation of IEEE 802.11 MAC model using the EXTREME testbed"
- 15h00-15h20: Ismail Amine, "An Improved IEEE 802.16 WiMAX Module for the NS-3 Simulator "
- 15h20-15h40: Kirill Andreev, "IEEE 802.11s Mesh Networking NS-3 Model"
- 15h40-16h00: Tom Henderson, "Wifi Phy validation"

16h00-16h30: Coffee Break

16h30-18h00: **Session 4: Miscellaneous**

- 16h30-16h50: Laurynas Riliskis, "TinyOS in NS3"
- 16h50-17h10: Michael Nowatkowski, "Simulation of Certificate Revocation List Distribution in Vehicular Ad Hoc Networks Using ns-3"
- 17h10-17h30: Fabian Mauchle, "Simulating Mobile IPv6 with ns-3"
- 17h30-17h50: Juan Font, "Articulating usage and promotion of ns-3 by student organizations in the context of the University of Seville"
- 17h50-18h00: Concluding remarks

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What is *ns-3*?

- *ns-3* is a discrete-event network simulator for Internet systems
  - ns-3 allows researchers to study Internet protocols and large-scale systems in a controlled environment
  - ns-3 is a new simulator (not backwards-compatible with ns-2)
- ns-3 is a free, open source software project organized around research community development and maintenance
  - the target user community is networking researchers and educators

ns-3 project goal

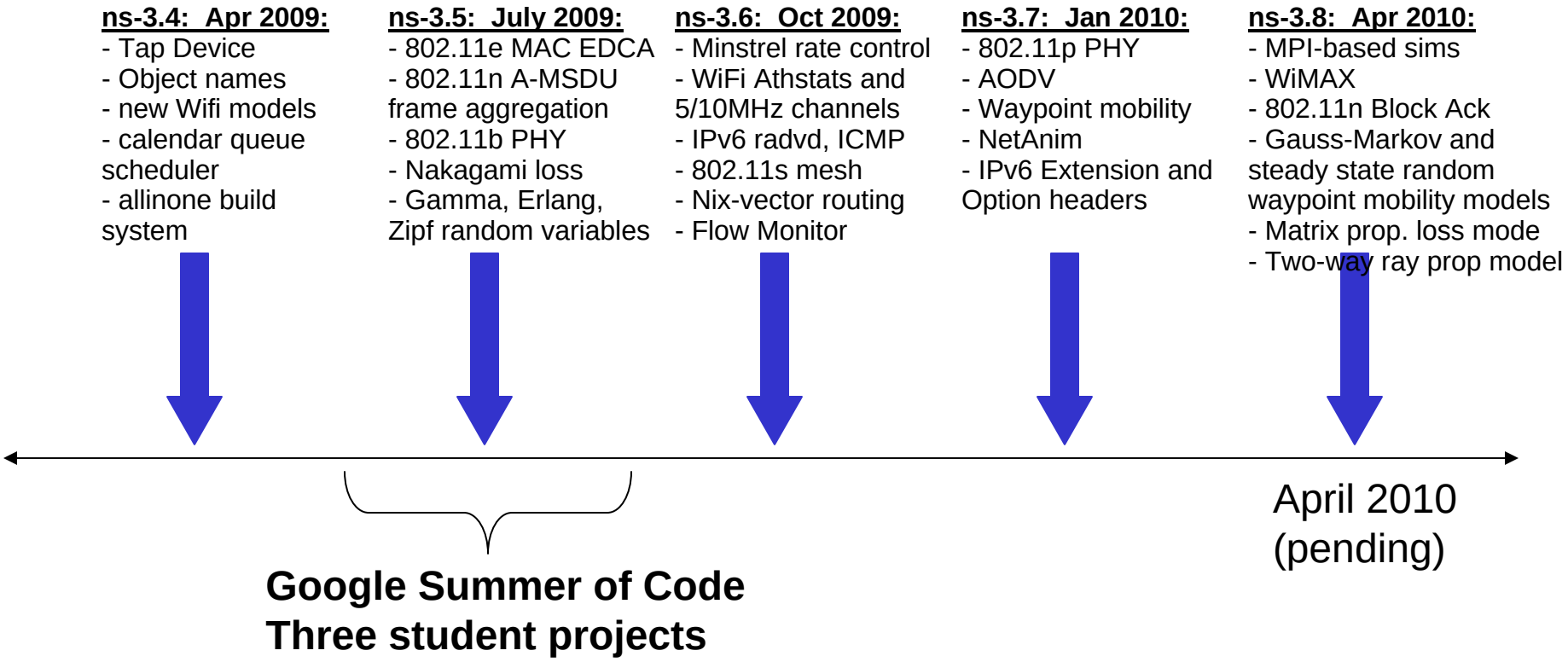
Develop a preferred, open simulation environment for networking research

1) a tool aligned with the simulation needs of modern networking research

2) an open-source project that encourages community contribution, peer review, and validation of the software

Progress since WNS3

- Four releases (ns-3.4 through ns-3.7)



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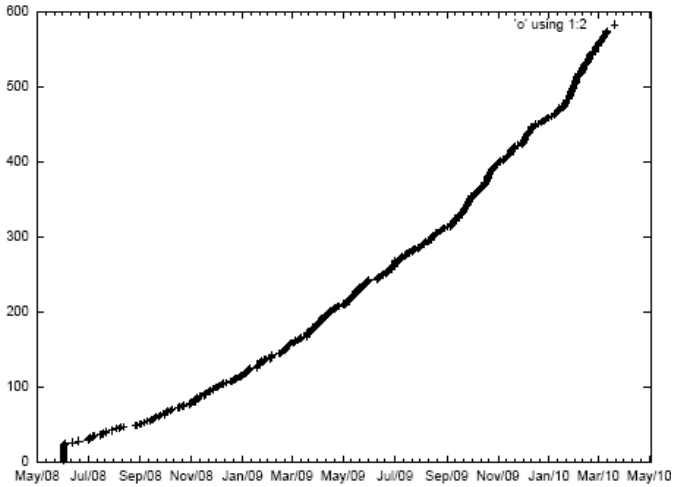
Progress since WNS3 (cont.)

- Lines of C++ code (wc src/ directory)
  - ns-3.4: 110,000
  - ns-3.8: 250,000
- Release downloads:
  - Jan 2009: 1700
  - Jan 2010: 10,300
- Authors
  - ns-3.4: 27
  - ns-3.8: 55
- New maintainers
  - Josh Pelkey, Pavel Boyko, Kirill Andreev, Sebastien Vincent, Amine Ismail

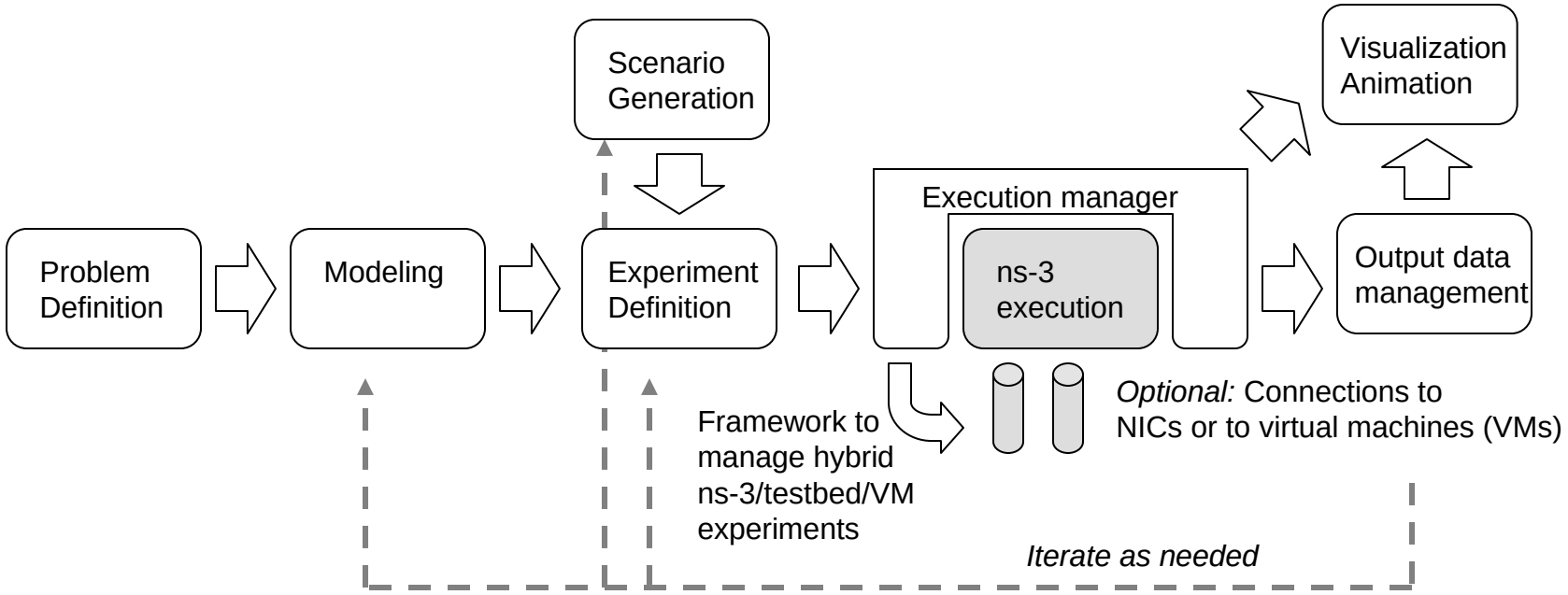


ns-3 users subscriber count

http://www.nsnam.org

Frameworks for ns-3

- What do we mean by frameworks?
  - Extensions to ns-3 outside of the core and models
  - **Reproducibility, rigor, ease of use**



Framework references

- Perrone et al, “On the Automation of Computer Network Simulations,” SIMUTools 2009
- Andreozzi et al, “A framework for large scale simulation and output analysis with ns-2 (ANSWER),” SIMUTools QoSim, 2009
- Joe Kopena’s statistics framework:
  - http://www.nsnam.org/wiki/index.php/Statistical_Framework_for_Network_Simulation
- Akaroa2: http://www-tkn.ee.tu-berlin.de/research/ns-2_akaroa-2/ns.html

New NSF award: "Frameworks for ns-3"

- Four years, awarded on 3 March 2010
- PIs/groups involved:
  - Univ. of Washington (Tom Henderson)
  - Georgia Tech. (George Riley)
  - Bucknell University (Felipe Perrone)
- Scope:
  - Automation framework
  - Scenario generation
  - Educational scripts
  - Software maintenance

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Future project directions

- Google Summer of Code 2010
- Some future capabilities under development or review:
  - ns-3-simu
  - ns-3 parallel (shared memory)
  - spectrum modeling
  - others
- Considering a U.S.-based workshop in late summer

ns-3 project financial support

- U.S. National Science Foundation
  - CNS 0551686, 0551378, 0551706
- Support from the French government (INRIA) via Planete research team (Walid Dabbous)
- Google Summer of Code (2008-09)
- Georgia Institute of Technology
- University of Washington
- U.S. Naval Research Laboratory

Acknowledgments

- Thanks
  - release managers for 2009-10 (Craig Dowell, Mathieu Lacage, Josh Pelkey)
  - maintainers and code reviewers (many people)
  - model contributors (many)
  - SIMUTools for inviting us back

Resources

Web site:

http://www.nsnam.org

Mailing list:

http://mailman.isi.edu/mailman/listinfo/ns-developers

IRC: #ns-3 at freenode.net

Tutorial:

http://www.nsnam.org/docs/tutorial/tutorial.html

Code server:

http://code.nsnam.org

Wiki:

http://www.nsnam.org/wiki/index.php/Main_Page