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A FreeBSD-based network simulation environment based on NS-3 and NSC

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Network Simulation Cradle (NSC)



- Specifies a consumer ↔ stack interface/API in `sim/sim_interface.h`
- Pre-existing FreeBSD 5, OpenBSD 3, Linux 2.6, LWIP, OMNeT stack ports
- Integrated with NS-2, NS-3 and OMNeT
- <https://secure.wand.net.nz/mercurial/nsc>

Network Simulator 3 (NS-3)



- Discrete event simulator (faster than real-time)
- Logical successor to the widely used NS-2
- Construct simulations in C++ or Python with arbitrary topologies based on existing OO models
- <http://code.nsnam.org/ns-3-dev>

CAIA's Contributions In A Nutshell



- Ported FreeBSD 9+10 network stacks to userspace
 - Socket to bottom of IP layers + infrastructure
- Wrapped with NSC C++ glue code to create NS-3 compatible dynamic library
- Better integrated NSC with NS-3
 - Socket upcalls, generic route manipulation, drive NSC stack off simulator virtual time, ...
- Extended NS-3 with models + simulations to support datacenter research
 - VOQ switch, Query/Response Application, TCP option support, generic dumbbell simulation, TCP incast simulation, ...

NS-3/NSC Uses



- Rapid prototyping in IP layer and above
- Regression testing
- Data networking research
- Teaching

Walkthrough + Demo



```
Istewart@Istewart-laptop> VBoxManage startvm --type  
headless freebsd9-amd64-caia-ns3-release
```

Waiting for VM "freebsd9-amd64-caia-ns3-release" to
power on...

VM "freebsd9-amd64-caia-ns3-release" has been
successfully started.

```
Istewart@Istewart-laptop> ssh -p2222 ns3@localhost
```

Acknowledgements



CISCO™



Questions?



<http://caia.swin.edu.au/urp/incast/>