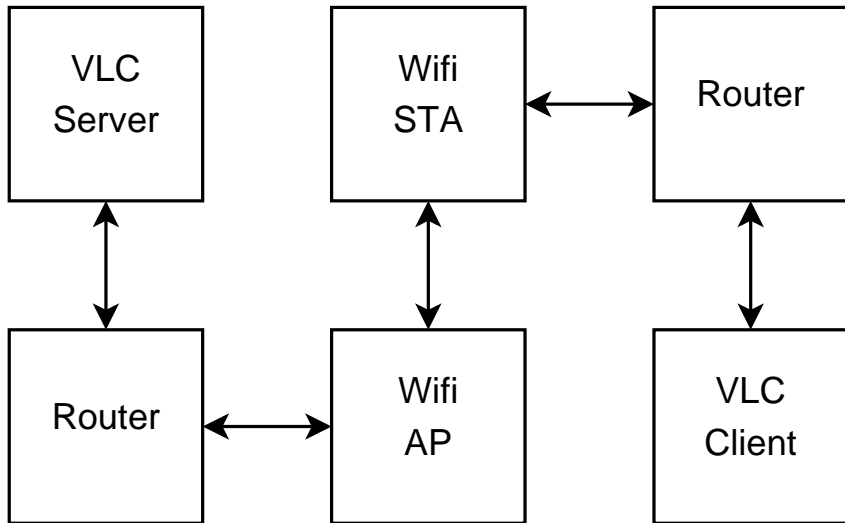


ns-3 Direct Code Execution

Objective Scenario

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Study the impact of wifi routing on video stream quality

Study the impact of wifi routing on video stream quality

Develop new wifi adhoc routing protocols

Problem

Need simulations:
Reproducibility
Debuggability
Testability

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Need real-world experiments:

- Wireless medium realism

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- Reproducibility

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- Testability

Need real-world experiments:

- Wireless medium realism

BUT:

- Must maintain two implementations

Manual Modifications

Convert global variables in arrays

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Convert system calls in simulation calls

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BUT, does not scale:

- Painful to do once

- Impossible to do for software updates

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The solution: Direct Code Execution

- Automate global variable virtualization

- Automate system call redirection

- Provide simulation system call replacements

Related Work

Network Simulation Cradle:

- Automated source modifications for C code

- Hard to extend to C++

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- Automated textual assembly modifications

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COOJA:

- Automated memory virtualization

- Slow

Adhoc ELF Loader:

- Fast

- Automated memory virtualization

- Automated system call redirection

Adhoc ELF Loader:

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- Automated memory virtualization

- Automated system call redirection

- Userspace system calls

Adhoc ELF Loader:

- Fast

- Automated memory virtualization

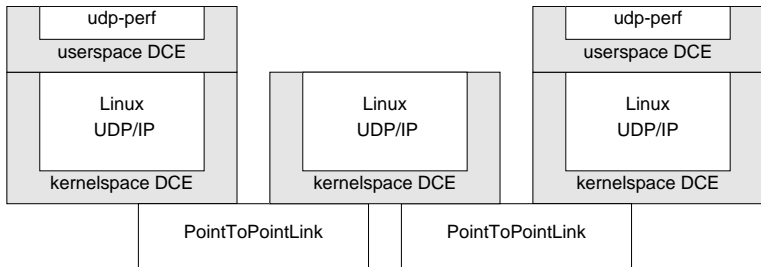
- Automated system call redirection

- Userspace system calls

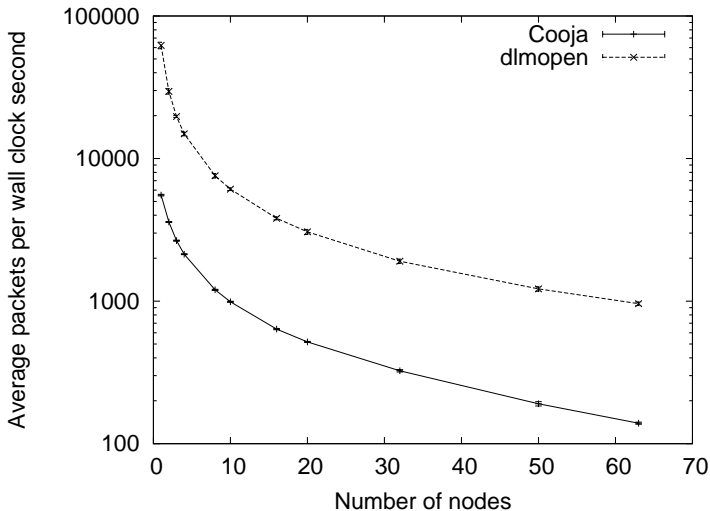
- Kernelspace system calls

Loader Performance

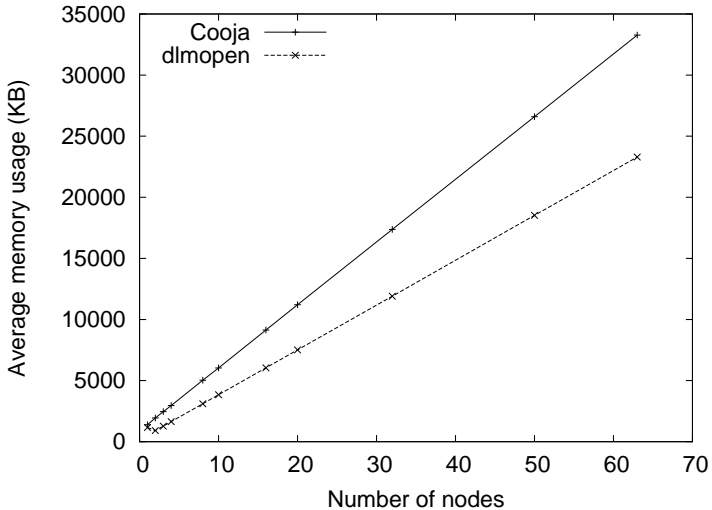
Scenario:



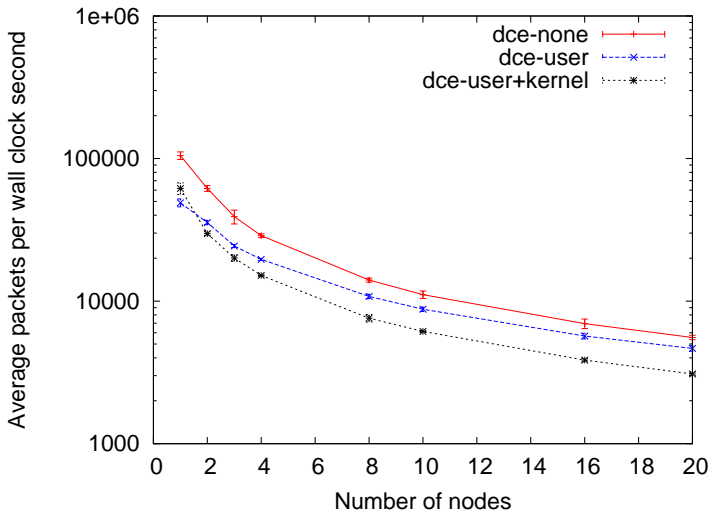
Loader Performance



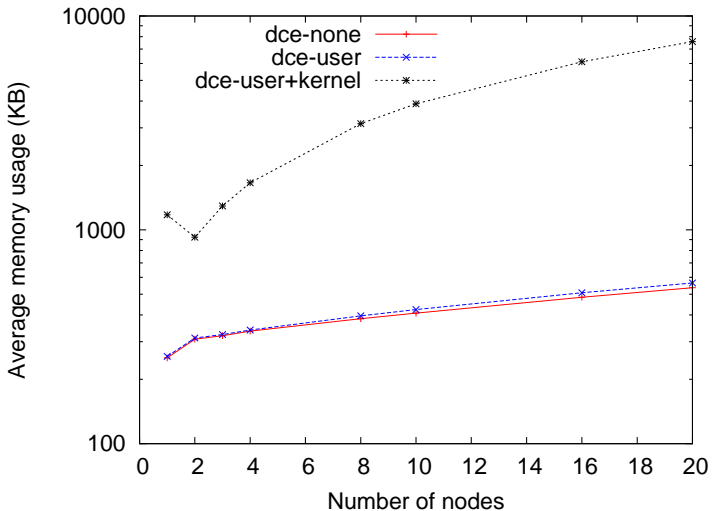
Loader Performance



System Performance



System Performance



Conclusion

Reuse existing protocol implementations:

Userspace: ping, traceroute, quagga, etc.

Kernelspace: IP, TCP, etc.

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Development platform

Test platform

Future Work

Improve userspace API coverage:

fork, wait, exec

Add X11 connection forwarding

More testing

Documentation

Write paper