Masking Network Heterogeneity with Shims

Danny Yuxing Huang*, Eric Kimbrel®, Justin Cappos®, Jeannie Albrecht*  
* Williams College, Williamstown, MA    ® University of Washington, Seattle, WA

Network Heterogeneity

Simple end-to-end communications are rare. We want to mask network heterogeneity in a modular way without modifying the application.

Existing Solutions

Application

MISMATCH OF SEMANTICS.

Mobility Lib

Network API

Preservation of Semantics

Application

Network API

Preservation of semantics.
Formally verified using model-based testing.

Can be stacked, removed, rearranged based on practical needs.

Transparent to application.
No need to change application.

Shims We’ve Built

Log Shim

Encryption Shim

Compression Shim

NAT Traversal Shim

Reverse Connection Shim

Forward Error Correct Shim

Currently in beta deployment on Seattle Testbed[1]

To be deployed on DieselNet[2], a vehicular network testbed

Shims

Application

NAT Shim

Mobility Shim

Network API

NAT Traversal Shim

Client App

connect(server, 1234)

connect(proxy, 5678)

NAT Shim

Network API

Server App

listen(server, 1234)

connect(proxy, 5678)

NAT Shim

Network API

Def connect(host, port):
proxy = findProxy()
connect(proxy, 5678)

Def listen(host, port):
proxy = findProxy()
connect(proxy, 5678)

Application

Compression Shim

Encryption Shim

Network API

Def socket.recv():
msg = nextshim.recv()
origmsg = decompress(msg)
return origmsg

Def socket.send(msg):
shortmsg = compress(msg)
return nextshim.send(shortmsg)

Def socket.send(msg):
secret = encode(msg)
return nextshim.send(secret)

Def socket.send(msg):
return nextshim.send(msg)