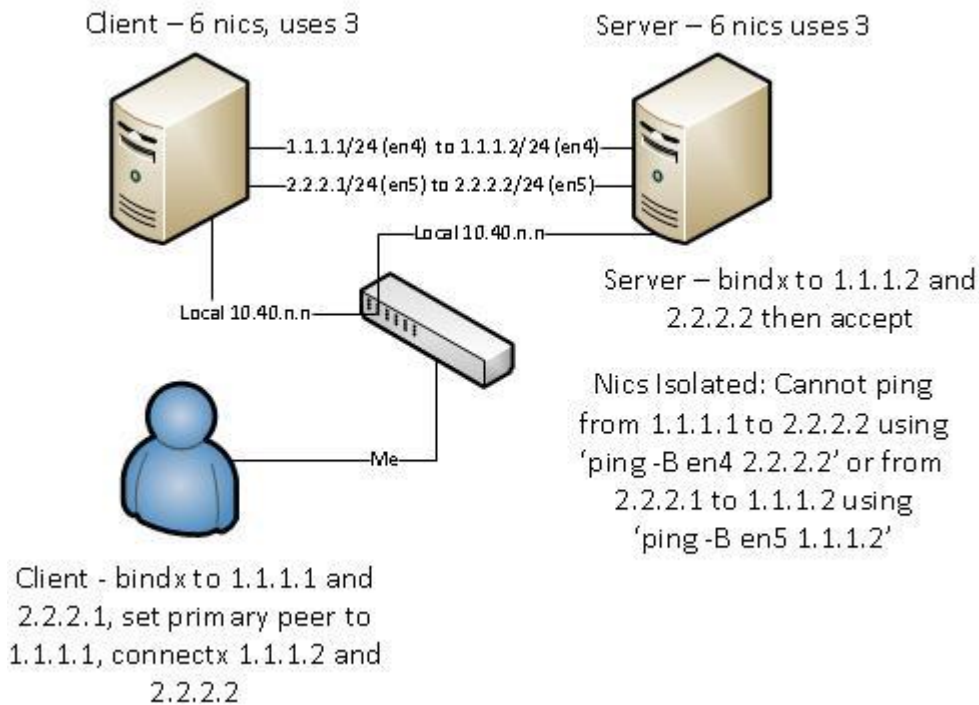


# Test Setup



## Ifconfigs

### Client:

#### # ifconfig

```
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 33136
    inet 127.0.0.1 netmask 0xff000000
    inet6 ::1 prefixlen 128
    inet6 fe80::1%lo0 prefixlen 64 scopeid 0x1
en0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    capabilities=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
    enabled=0
    address: 00:30:64:30:ee:84
    media: Ethernet autoselect (100baseTX full-duplex)
    status: active
    inet 10.40.44.145 netmask 0xfffff800 broadcast 10.40.47.255
    inet6 fe80::230:64ff:fe30:ee84%en0 prefixlen 64 scopeid 0x11
en1: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
    capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
    enabled=0
    address: 00:30:64:30:ee:85
    media: Ethernet none
    inet 192.168.1.1 netmask 0xfffff00 broadcast 192.168.1.255
    inet6 fe80::230:64ff:fe30:ee85%en1 prefixlen 64 scopeid 0x12
en2: flags=8802<BROADCAST,SIMPLEX,MULTICAST> mtu 1500
    capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
    capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
    enabled=0
```

```

        address: 00:30:64:59:9e:b6
        media: Ethernet none
en3: flags=8802<BROADCAST,SIMPLEX,MULTICAST> mtu 1500
    capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
    capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
    enabled=0
    address: 00:30:64:59:9e:b7
    media: Ethernet none
en4: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
    capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
    enabled=0
    address: 00:30:64:59:9e:b8
    media: Ethernet autoselect (1000baseT full-duplex,flowcontrol,rxpause,txpause)
    status: active
    inet 1.1.1.1 netmask 0xfffff00 broadcast 1.1.1.255
    inet6 fe80::230:64ff:fe59:9eb8%en4 prefixlen 64 scopeid 0x15
en5: flags=8b43<UP,BROADCAST,RUNNING,PROMISC,ALLMULTI,SIMPLEX,MULTICAST> mtu 1500
    capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
    capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
    enabled=0
    address: 00:30:64:59:9e:b9
    media: Ethernet autoselect (1000baseT full-duplex,flowcontrol,rxpause,txpause)
    status: active
    inet 2.2.2.1 netmask 0xfffff00 broadcast 2.2.2.255
    inet6 fe80::230:64ff:fe59:9eb9%en5 prefixlen 64 scopeid 0x16

```

## Server

```

# ifconfig
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 33136
    inet 127.0.0.1 netmask 0xff000000
    inet6 ::1 prefixlen 128
    inet6 fe80::1%lo0 prefixlen 64 scopeid 0x1
en0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    capabilities=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
    enabled=0
    address: 00:30:64:64:94:84
    media: Ethernet autoselect (100baseTX full-duplex)
    status: active
    inet 10.40.44.193 netmask 0xffff800 broadcast 10.40.47.255
    inet6 fe80::230:64ff:fe64:9484%en0 prefixlen 64 scopeid 0x11
en1: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
    capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
    enabled=0
    address: 00:30:64:64:94:85
    media: Ethernet none
    inet 192.168.1.1 netmask 0xfffff00 broadcast 192.168.1.255
    inet6 fe80::230:64ff:fe64:9485%en1 prefixlen 64 scopeid 0x12
en2: flags=8802<BROADCAST,SIMPLEX,MULTICAST> mtu 1500
    capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
    capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
    enabled=0
    address: 00:30:64:5f:1e:fc
    media: Ethernet none
en3: flags=8802<BROADCAST,SIMPLEX,MULTICAST> mtu 1500
    capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
    capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
    enabled=0
    address: 00:30:64:5f:1e:fd
    media: Ethernet none
en4: flags=8b43<UP,BROADCAST,RUNNING,PROMISC,ALLMULTI,SIMPLEX,MULTICAST> mtu 1500

```

```

capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
enabled=0
address: 00:30:64:5f:1e:fe
media: Ethernet autoselect (1000baseT full-duplex,flowcontrol,rxpause,txpause)
status: active
inet 1.1.1.2 netmask 0xffffffff broadcast 1.1.1.255
inet6 fe80::230:64ff:fe5f:1efe%en4 prefixlen 64 scopeid 0x15
en5: flags=8b43<UP,BROADCAST,RUNNING,PROMISC,ALLMULTI,SIMPLEX,MULTICAST> mtu 1500
capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
enabled=0
address: 00:30:64:5f:1e:ff
media: Ethernet autoselect (1000baseT full-duplex,flowcontrol,rxpause,txpause)
status: active
inet 2.2.2.2 netmask 0xffffffff broadcast 2.2.2.255
inet6 fe80::230:64ff:fe5f:1eff%en5 prefixlen 64 scopeid 0x16
#

```

## Client Pings

```

# ping -B en4 1.1.1.2
PING 1.1.1.2 (1.1.1.2): 56 data bytes
64 bytes from 1.1.1.2: icmp_seq=0 ttl=255 time=1 ms
64 bytes from 1.1.1.2: icmp_seq=1 ttl=255 time=0 ms

----1.1.1.2 PING Statistics----
2 packets transmitted, 2 packets received, 0% packet loss
round-trip min/avg/max = 0/0/1 ms  variance = 1 ms^2
# ping -B en4 2.2.2.2
PING 2.2.2.2 (2.2.2.2): 56 data bytes
ping: sendto: No route to host
ping: sendto: No route to host

2 packets transmitted, 0 packets received, 100% packet loss
# ping -B en5 1.1.1.2
PING 1.1.1.2 (1.1.1.2): 56 data bytes
ping: sendto: No route to host
ping: sendto: No route to host

----1.1.1.2 PING Statistics----
2 packets transmitted, 0 packets received, 100% packet loss
# ping -B en5 2.2.2.2
PING 2.2.2.2 (2.2.2.2): 56 data bytes
64 bytes from 2.2.2.2: icmp_seq=0 ttl=255 time=0 ms
64 bytes from 2.2.2.2: icmp_seq=1 ttl=255 time=0 ms

```

## Code

I modified the `programs/client.c` and `programs/discard_server.c` code to turn on all debugging.

In `client.c` I added code to allow me to bindx to 1.1.1.1 and 2.2.2.1. The new code also grabs the association id passed to the `handle_association_change_event()` code and I use that association to set the default peer to 1.1.1.1. I also changed `connect()` to `connectx()` and pass it the two IPs on the server side (1.1.1.2 and 2.2.2.2)

In `discard_server.c` I changed `bind()` to `bindx()` and passed in the two server side IPs and PORT.

## Execution

I start both apps on their respective machines. In the client, immediately after setting the peer, there is an INIT send and it decides that 2.2.2.1 is to be used? But I have set the primary to 1.1.1.1!

Here is a snippet from the output (my entries have the \*\*\*> added):

```
...
Association change SCTP_COMM_UP, streams (in/out) = (10/10), supports PR AUTH ASCONF MULTIBUF RE-CONFIG.
***> Calling set primary to 1.1.1.1
***> Setting primary to 1.1.1.1 using association: 3
asconf_queue_mgmt: appended asconf SET_PRIM_ADDR: IPv4 address: 1.1.1.1:0
set_primary_ip_address_sa: queued on tcb=82d0630, IPv4 address: 1.1.1.1:0
Local addresses: 2.2.2.1, 1.1.1.1.
Peer addresses: 1.1.1.2, 2.2.2.2.
Timer type 2 goes off
Error count for 82d0100 now 1 thresh:5
Overall error count for 82d0688 now 1 thresh:8 state:1
Sending INIT
Sending INIT - calls lowlevel_output
Select source addr for:IPv4 address: 2.2.2.2:9
Is destination preferred:IPv4 address: 2.2.2.1:0
src_loop:0 src_priv:0 src_glob:1
dest_loop:0 dest_priv:0 dest_glob:1
YES
Calling ipv4 output routine from low level src addr:2020201
Destination is 2020202
RTP route is 82501d0 through
IP output returns 250
```

## CLIENT EN5 DOWN

In another test I started the modified client on the client machine with interface en5 (2.2.2.1) down and it still thought 2.2.2.1 was preferred. The server never INIT\_ACKd. Should this not have at least attempted to connect through 1.1.1.1 - 1.1.1.2?

Output:

```
# ifconfig en5 down
# ifconfig
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 33136
    inet 127.0.0.1 netmask 0xff000000
    inet6 ::1 prefixlen 128
    inet6 fe80::1%lo0 prefixlen 64 scopeid 0x1
en0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    capabilities=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
    enabled=0
    address: 00:30:64:30:ee:84
    media: Ethernet autoselect (100baseTX full-duplex)
    status: active
    inet 10.40.44.145 netmask 0xfffff800 broadcast 10.40.47.255
    inet6 fe80::230:64ff:fe30:ee84%en0 prefixlen 64 scopeid 0x11
en1: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
```

```
capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
enabled=0
address: 00:30:64:30:ee:85
media: Ethernet none
inet 192.168.1.1 netmask 0xfffff00 broadcast 192.168.1.255
inet6 fe80::230:64ff:fe30:ee85%en1 prefixlen 64 scopeid 0x12
en2: flags=8802<BROADCAST,SIMPLEX,MULTICAST> mtu 1500
capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
enabled=0
address: 00:30:64:59:9e:b6
media: Ethernet none
en3: flags=8802<BROADCAST,SIMPLEX,MULTICAST> mtu 1500
capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
enabled=0
address: 00:30:64:59:9e:b7
media: Ethernet none
en4: flags=8b43<UP,BROADCAST,RUNNING,PROMISC,ALLMULTI,SIMPLEX,MULTICAST> mtu 1500
capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
enabled=0
address: 00:30:64:59:9e:b8
media: Ethernet autoselect (1000baseT full-duplex,flowcontrol,rxpause,txpause)
status: active
inet 1.1.1.1 netmask 0xfffff00 broadcast 1.1.1.255
inet6 fe80::230:64ff:fe59:9eb8%en4 prefixlen 64 scopeid 0x15
en5: flags=8b02<BROADCAST,PROMISC,ALLMULTI,SIMPLEX,MULTICAST> mtu 1500
capabilities rx=1f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM>
capabilities tx=7f<IP4CSUM,TCP4CSUM,UDP4CSUM,TCP6CSUM,UDP6CSUM,TSO4,TSO6>
enabled=0
address: 00:30:64:59:9e:b9
media: Ethernet autoselect (1000baseT full-duplex,flowcontrol,rxpause,txpause)
status: active
inet 2.2.2.1 netmask 0xfffff00 broadcast 2.2.2.255
inet6 fe80::230:64ff:fe59:9eb9%en5 prefixlen 64 scopeid 0x16
# ./client-qcc.bin 1.1.1.2 9
***> Calling init
***> Set debug mode
***> Create socket
SCTP: add HMAC id 1 to list
SCTP: added chunk 193 (0xc1) to Auth list
SCTP: added chunk 128 (0x80) to Auth list
***> Setup for event reading
***> Bind to 1.1.1.1 and 2.2.2.1
***> Added address 0) 1.1.1.1 to be bound
***> Added address 1) 2.2.2.1 to be bound
```

Bind called port: 0  
Addr: IPv4 address: 1.1.1.1:0  
Main hash to bind at head:825e6b8, bound port:56084 - in tcp\_pool=0  
Ok laddr->ifa:8253750 is possible, \*\*\*> Connecting to 1.1.1.2:9  
\*\*\*> Added address 0) 1.1.1.2:9 to be connectx'd to  
\*\*\*> Added address 1) 2.2.2.2:9 to be connectx'd to  
Connectx called  
Allocate an association for peer:IPv4 address: 1.1.1.2:9  
Port:9  
Adding an address (from:1) to the peer: IPv4 address: 1.1.1.2:9  
Association 82d0630 now allocated  
Adding an address (from:8) to the peer: IPv4 address: 2.2.2.2:9  
**Sending INIT**  
Sending INIT - calls lowlevel\_output  
Select source addr for:IPv4 address: 1.1.1.2:9  
**Is destination preferred:IPv4 address: 2.2.2.1:0**  
src\_loop:0 src\_priv:0 src\_glob:1  
dest\_loop:0 dest\_priv:0 dest\_glob:1  
**YES**  
Calling ipv4 output routine from low level src addr:2020201  
Destination is 1010102  
RTP route is 8250190 through  
IP output returns 0  
\*\*\*> Calling set primary to 1.1.1.1  
\*\*\*> Setting primary to 1.1.1.1 using association: 3  
asconf\_queue\_mgmt: appended asconf SET\_PRIM\_ADDR: IPv4 address: 1.1.1.1:0  
set\_primary\_ip\_address\_sa: queued on tcb=82d0630, IPv4 address: 1.1.1.1:0  
Local addresses: 2.2.2.1, 1.1.1.1.  
Peer addresses: 1.1.1.2, 2.2.2.2.  
**Timer type 2 goes off**  
Error count for 82d0100 now 1 thresh:5  
Overall error count for 82d0688 now 1 thresh:8 state:1  
**Sending INIT**  
Sending INIT - calls lowlevel\_output  
Select source addr for:IPv4 address: 2.2.2.2:9  
**Is destination preferred:IPv4 address: 2.2.2.1:0**  
src\_loop:0 src\_priv:0 src\_glob:1  
dest\_loop:0 dest\_priv:0 dest\_glob:1  
**YES**  
Calling ipv4 output routine from low level src addr:2020201  
Destination is 2020202  
RTP route is 82501d0 through  
IP output returns 250  
**Gak send error 250**  
Timer now complete (type = 2)  
Timer type 2 goes off  
Error count for 82cfe70 now 1 thresh:5  
Overall error count for 82d0688 now 2 thresh:8 state:1

Sending INIT  
Sending INIT - calls lowlevel\_output  
Calling ipv4 output routine from low level src addr:2020201  
Destination is 1010102  
RTP route is 8250190 through  
IP output returns 0  
Timer now complete (type = 2)  
Timer type 2 goes off  
Error count for 82d0100 now 2 thresh:5  
Overall error count for 82d0688 now 3 thresh:8 state:1  
Sending INIT  
Sending INIT - calls lowlevel\_output  
Calling ipv4 output routine from low level src addr:2020201  
Destination is 2020202  
RTP route is 82501d0 through  
IP output returns 250  
Gak send error 250  
Timer now complete (type = 2)  
recv\_function\_raw: Received 76 bytes. - calling sctp\_common\_input\_processing with off=32  
stcb:0 inp:0  
stcb is 0  
**Timer type 2 goes off**  
Error count for 82cfe70 now 2 thresh:5  
Overall error count for 82d0688 now 4 thresh:8 state:1  
**Sending INIT**  
Sending INIT - calls lowlevel\_output  
Calling ipv4 output routine from low level src addr:2020201  
Destination is 1010102  
RTP route is 8250190 through  
IP output returns 0  
Timer now complete (type = 2)  
Timer type 2 goes off  
Error count for 82d0100 now 3 thresh:5  
Overall error count for 82d0688 now 5 thresh:8 state:1  
Sending INIT  
Sending INIT - calls lowlevel\_output  
Calling ipv4 output routine from low level src addr:2020201  
Destination is 2020202  
RTP route is 82501d0 through  
IP output returns 250  
**Gak send error 250**  
Timer now complete (type = 2)  
Timer type 2 goes off  
Error count for 82cfe70 now 3 thresh:5  
Overall error count for 82d0688 now 6 thresh:8 state:1  
Sending INIT  
Sending INIT - calls lowlevel\_output  
Calling ipv4 output routine from low level src addr:2020201

Destination is 1010102  
RTP route is 8250190 through  
IP output returns 0  
Timer now complete (type = 2)