
Subject: Re: L2 network namespaces + macvlan performances

Posted by [Daniel Lezcano](#) on Sat, 07 Jul 2007 11:39:32 GMT

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Benjamin Thery wrote:

> Following a discussion we had at OLS concerning L2 network namespace
> performances and how the new macvlan driver could potentially improve
> them, I've ported the macvlan patchset on top of Eric's net namespace
> patchset on 2.6.22-rc4-mm2.

>

> A little bit of history:

>

> Some months ago, when we ran some performance tests (using netperf)
> on net namespace, we observed the following things:

>

> Using 'etun', the virtual ethernet tunnel driver, and IP routes
> from inside a network namespace,

>

> - The throughput is the same as the "normal" case(*)
> (* normal case: no namespace, using physical adapters).
> No regression. Good.

>

> - But the CPU load increases a lot. Bad.

> The reasons are:

> - All checksums are done in software. No hardware offloading.
> - Every TCP packets going through the etun devices are
> duplicated in ip_forward() before we decrease the ttl.
> (packets are routed between both ends of etun)

>

> We also made some testing with bridges, and obtained the same results:

> CPU load increase:

> - No hardware offloading
> - Packets are duplicated somewhere in the bridge+netfilter
> code (can't remember where right now)

>

>

> This time, I've replaced the etun interface by the new macvlan,
> which should benefits from the hardware offloading capabilities of the
> physical adapter and suppress the forwarding stuff.

>

> My test setup is:

>

> Host A Host B

>

> | _____ | | _____ |
> | | Netns 1 | | | |
> | | | |
> | | macvlan0 | | | |

```

> | | | | |
> | | | | |
> | | | | |
> | eth0 (192.168.0.2) | eth0 (192.168.0.1)
> |
> -----
> macvlan0 (192.168.0.3)
>
> - netperf runs on host A
> - netserver runs on host B
> - Adapters speed is 1GB/s
>
> On this setup I ran the following netperf tests: TCP_STREAM, TCP_MAERTS,
> TCP_RR, UDP_STREAM, UDP_RR.
>
> Between the "normal" case and the "net namespace + macvlan" case,
> results are about the same for both the throughput and the local CPU
> load for the following test types: TCP_MAERTS, TCP_RR, UDP_STREAM, UDP_RR.
>
> macvlan looks like a very good candidate for network namespace in these
> cases.
>
> But, with the TCP_STREAM test, I observed the CPU load is about the
> same (that's what we wanted) but the throughput decreases by about 5%:
> from 850MB/s down to 810MB/s.
> I haven't investigated yet why the throughput decrease in the case.
> Does it come from my setup, from macvlan additional treatments, other? I
> don't know yet
>
> Attached to this email you'll find the raw netperf outputs for the three
> cases:
>
> - netperf through a physical adapter, no namespace:
>   netperf-results-2.6.22-rc4-mm2-netns1-vanilla.txt
> - netperf through etun, inside a namespace:
>   netperf-results-2.6.22-rc4-mm2-netns1-using-etun.txt
> - netperf through macvlan, inside a namespace:
>   netperf-results-2.6.22-rc4-mm2-netns1-using-macvlan.txt
>
>
> macvlan looks promising.
>
> Regards,
> Benjamin

```

Very interesting.

Thank you very much Benjamin for investigating this.

I will update the <http://lxc.sf.net> web site with your description and

results.

```
> -----
>
> NETPERF RESULTS: the "normal" case :
> =====
> No network namespace, traffic goes through real 1GB/s physical adapters.
>
> -----
> TCP STREAM TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1 (192.168.76.1) port
0 AF_INET : +/-2.5% @ 95% conf.
> Recv Send Send Utilization Service Demand
> Socket Socket Message Elapsed Send Recv Send Recv
> Size Size Size Time Throughput local remote local remote
> bytes bytes bytes secs. 10^6bits/s % S % S us/KB us/KB
>
> 87380 16384 1400 20.03 857.39 6.39 9.75 2.444 3.727
> -----
>
> -----
> TCP MAERTS TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1 (192.168.76.1) port
0 AF_INET : +/-2.5% @ 95% conf.
> Recv Send Send Utilization Service Demand
> Socket Socket Message Elapsed Send Recv Send Recv
> Size Size Size Time Throughput local remote local remote
> bytes bytes bytes secs. 10^6bits/s % S % S us/KB us/KB
>
> 87380 16384 87380 20.03 763.15 4.75 10.33 2.038 4.434
> -----
>
> -----
> TCP REQUEST/RESPONSE TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1
(192.168.76.1) port 0 AF_INET : +/-2.5% @ 95% conf.
> Local /Remote
> Socket Size Request Resp. Elapsed Trans. CPU CPU S.dem S.dem
> Send Recv Size Size Time Rate local remote local remote
> bytes bytes bytes bytes secs. per sec % S % S us/Tr us/Tr
>
> 16384 87380 1 1 20.00 12594.24 4.16 6.06 13.212 19.231
> 16384 87380
> -----
>
> -----
> UDP UNIDIRECTIONAL SEND TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1
(192.168.76.1) port 0 AF_INET : +/-2.5% @ 95% conf.
> Socket Message Elapsed Messages CPU Service
> Size Size Time Okay Errors Throughput Util Demand
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> bytes bytes secs # # 10^6bits/sec % SS us/KB
>
> 110592 1400 20.00 1701653 0 952.9 6.84 2.354
> 107520 20.00 1701647 952.9 9.66 3.321
>
> -----
>
> -----
> UDP REQUEST/RESPONSE TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1
(192.168.76.1) port 0 AF_INET : +/-2.5% @ 95% conf.
> Local /Remote
> Socket Size Request Resp. Elapsed Trans. CPU CPU S.dem S.dem
> Send Recv Size Size Time Rate local remote local remote
> bytes bytes bytes bytes secs. per sec % S % S us/Tr us/Tr
>
> 110592 110592 1 1 20.00 13789.92 3.82 6.16 11.087 17.855
> 107520 107520
> -----
>
>
>
> -----
>
> NETPERF RESULTS: the etun case :
> =====
> netperf is ran from a network namespace,
> traffic goes through etun adapters.
>
> -----
> TCP STREAM TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1 (192.168.76.1) port
0 AF_INET : +/-2.5% @ 95% conf.
> Recv Send Send Utilization Service Demand
> Socket Socket Message Elapsed Send Recv Send Recv
> Size Size Size Time Throughput local remote local remote
> bytes bytes bytes secs. 10^6bits/s % S % U us/KB us/KB
>
> 87380 16384 1400 40.02 840.64 12.89 -1.00 5.025 -1.000
> -----
>
> -----
> TCP MAERTS TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1 (192.168.76.1) port
0 AF_INET : +/-2.5% @ 95% conf.
> Recv Send Send Utilization Service Demand
> Socket Socket Message Elapsed Send Recv Send Recv
> Size Size Size Time Throughput local remote local remote
> bytes bytes bytes secs. 10^6bits/s % S % U us/KB us/KB
>
> 87380 16384 87380 40.03 763.30 6.29 -1.00 2.701 -1.000

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> -----
>
> -----
> TCP REQUEST/RESPONSE TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1
(192.168.76.1) port 0 AF_INET : +/-2.5% @ 95% conf.
> Local /Remote
> Socket Size Request Resp. Elapsed Trans. CPU CPU S.dem S.dem
> Send Recv Size Size Time Rate local remote local remote
> bytes bytes bytes bytes secs. per sec % S % U us/Tr us/Tr
>
> 16384 87380 1 1 40.00 12230.34 4.64 -1.00 15.167 -1.000
> 16384 87380
> -----
>
> -----
> UDP UNIDIRECTIONAL SEND TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1
(192.168.76.1) port 0 AF_INET : +/-2.5% @ 95% conf.
> Socket Message Elapsed Messages CPU Service
> Size Size Time Okay Errors Throughput Util Demand
> bytes bytes secs # # 10^6bits/sec % SU us/KB
>
> 110592 1400 40.00 12981742 0 3634.7 25.64 8.801
> 107520 40.00 3409123 954.5 -1.00 -1.000
>
> -----
>
> -----
> UDP REQUEST/RESPONSE TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1
(192.168.76.1) port 0 AF_INET : +/-2.5% @ 95% conf.
> Local /Remote
> Socket Size Request Resp. Elapsed Trans. CPU CPU S.dem S.dem
> Send Recv Size Size Time Rate local remote local remote
> bytes bytes bytes bytes secs. per sec % S % U us/Tr us/Tr
>
> 110592 110592 1 1 40.00 13385.96 4.22 -1.00 12.658 -1.000
> 107520 107520
> -----
>
>
>
> -----
>
> NETPERF RESULTS: the "normal" case :
> =====
> netperf is ran from a network namespace,
> traffic goes through a macvlan adapter.
>
> -----

```

```

> TCP STREAM TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1 (192.168.76.1) port
0 AF_INET : +/-2.5% @ 95% conf.
> Recv Send Send Utilization Service Demand
> Socket Socket Message Elapsed Send Recv Send Recv
> Size Size Size Time Throughput local remote local remote
> bytes bytes bytes secs. 10^6bits/s % S % S us/KB us/KB
>
> 87380 16384 1400 20.03 817.40 7.26 12.96 2.912 5.200
> -----
>
> -----
> TCP MAERTS TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1 (192.168.76.1) port
0 AF_INET : +/-2.5% @ 95% conf.
> Recv Send Send Utilization Service Demand
> Socket Socket Message Elapsed Send Recv Send Recv
> Size Size Size Time Throughput local remote local remote
> bytes bytes bytes secs. 10^6bits/s % S % S us/KB us/KB
>
> 87380 16384 87380 20.03 763.33 4.95 10.32 2.127 4.429
> -----
>
> -----
> TCP REQUEST/RESPONSE TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1
(192.168.76.1) port 0 AF_INET : +/-2.5% @ 95% conf.
> Local /Remote
> Socket Size Request Resp. Elapsed Trans. CPU CPU S.dem S.dem
> Send Recv Size Size Time Rate local remote local remote
> bytes bytes bytes bytes secs. per sec % S % S us/Tr us/Tr
>
> 16384 87380 1 1 20.00 12448.36 4.34 6.21 13.950 19.939
> 16384 87380
> -----
>
> -----
> UDP UNIDIRECTIONAL SEND TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1
(192.168.76.1) port 0 AF_INET : +/-2.5% @ 95% conf.
> Socket Message Elapsed Messages CPU Service
> Size Size Time Okay Errors Throughput Util Demand
> bytes bytes secs # # 10^6bits/sec % SS us/KB
>
> 110592 1400 20.00 1704200 0 954.3 7.11 2.440
> 107520 20.00 1704194 954.3 9.66 3.318
>
> -----
>
> -----
> UDP REQUEST/RESPONSE TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 192.168.76.1
(192.168.76.1) port 0 AF_INET : +/-2.5% @ 95% conf.

```

```

> Local /Remote
> Socket Size Request Resp. Elapsed Trans. CPU CPU S.dem S.dem
> Send Recv Size Size Time Rate local remote local remote
> bytes bytes bytes bytes secs. per sec % S % S us/Tr us/Tr
>
> 110592 110592 1 1 20.00 13751.49 3.98 6.09 11.625 17.788
> 107520 107520
> -----
>

```

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