

# TRex Virtual Machine setup and basic usage

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| <b>REVISION HISTORY</b> |
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# Chapter 1

## Introduction

### 1.1 TRex traffic generator

TRex traffic generator is a tool designed to benchmark platforms using realistic traffic.

One of the tools through which TRex can be learned and tested is a virtual machine instance, fully simulating TRex without the need for any additional hardware.

#### 1.1.1 TRex Virtual Machine

The TRex Virtual Machine is based on Oracle's Virtual Box freeware.

It is designed to enable TRex newbies to explore this tool without any special resources.

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## Chapter 2

# Setup and Usage

### 2.1 Setup

In order to use TRex VM, there are several easy steps to follow:

1. Download and install Oracle VM Virtual Box Manager ([VB download link](#)).  
During installation you will be asked to allow the installation of system devices component interactions. Allow it.
2. Download the latest TRex VM by [clicking on this link](#). Notice that this is the latest VM image, not the latest TRex version. This can be used for demonstration purposes. After installation, you can upgrade to latest TRex image if needed (Instructions below).
3. Open Oracle VM Virtual Box application installed at step 1.
4. Under *File* tab, select *Import Appliance*. The following screen will appear:

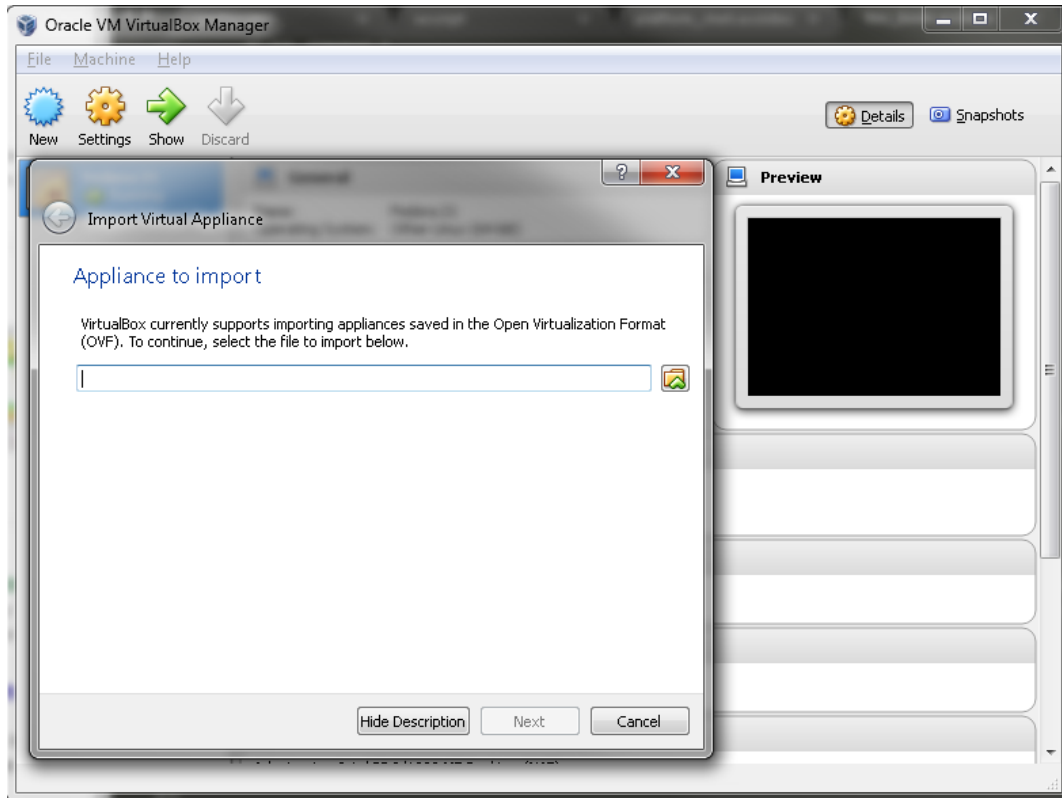


Figure 2.1: VM import screen

1. Browse and select the .ova file you have downloaded at step 2, and click *continue*.
2. Click *Next*, and then make sure that the 'Reinitialize the MAC address of all network cards' checkbox is **not selected**.
3. Click *import* and wait for the import process to finish. **That's it! you're all good and set to go!**

## 2.2 Launching and logging into the machine

First, launch the virtual machine by selecting it in the VM's menu and hitting *Start* button.

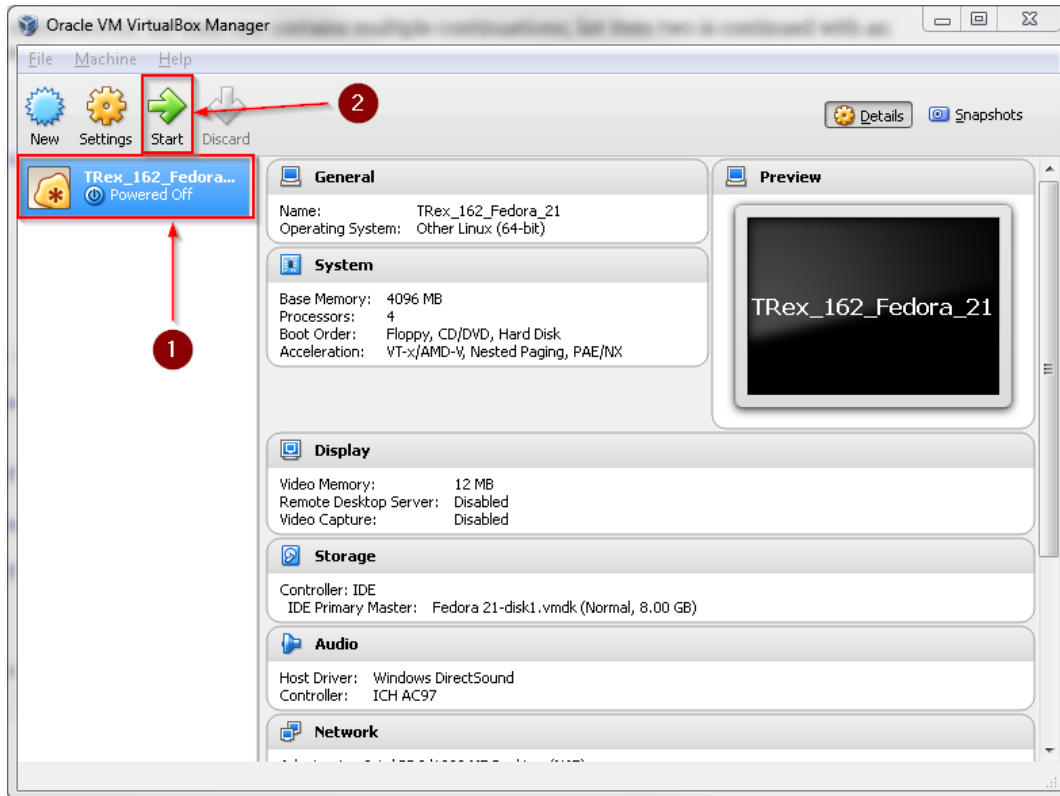


Figure 2.2: TRex VM launching screen

**Important**

You may encounter "VT-x is disabled" error, as shown in the image below. In that case, please refer to [this link](#) and follow the provided steps to overcome this issue.

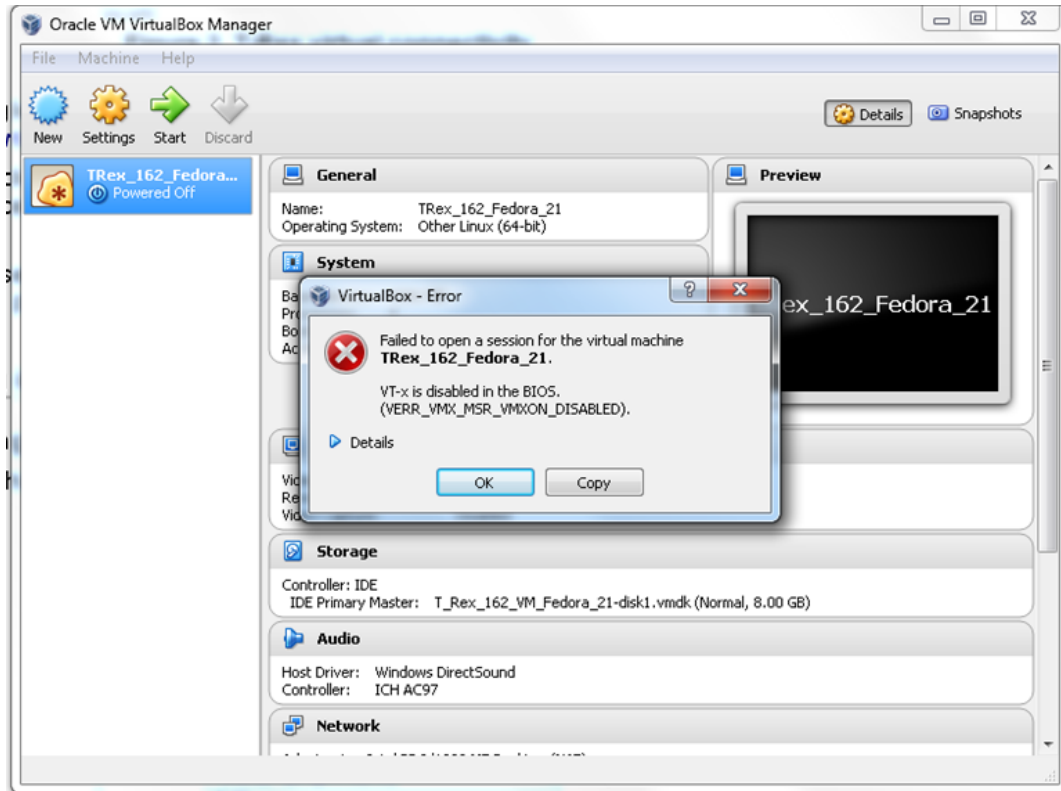


Figure 2.3: VT-x disabled possible error message



Once the machine finished booting, login to it using the following credentials:

- Username: `trex`
- Password: `trex`

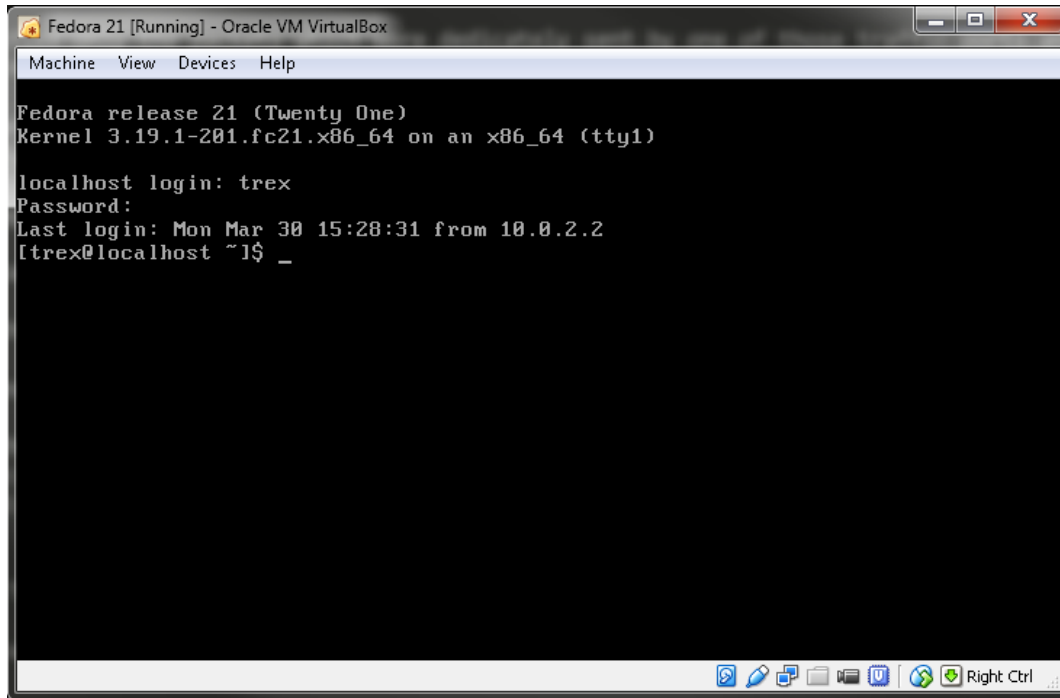


Figure 2.4: TRex VM login

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**Tip**

Remote connection to the machine from anywhere in the hosting machine can be set up using the following command:  
`ssh -p 3022 trex@127.0.0.1`

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## 2.3 Running TRex traffic generator

1. **upgrade** to the latest trex package see [how to upgrade](#)
2. Change dir to latest version updated for example `cd /home/trex/v2.20/`. (don't use the old version in the OVA)
3. Run your desired TRex command.

**Important**

When launching a TRex command, pay attention to make sure that you are using `sudo` prefix at the beginning of the command line. + and that you updated to latest v1.62 is very old version

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For example, let's run TRex with DNS traffic. The command is:

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```
[trex@localhost v1.62]$ sudo ./t-rex-64 -f cap2/dns.yaml -d 100 -m 1 --nc
Starting TRex 1.62 please wait ...
found configuration file at /etc/trex_cfg.yaml
zmq publisher at: tcp://*:4500

...
❶
...

-Per port stats table
  ports |           0 |           1
-----|-----|-----
  opackets |           17 |           17
   obytes |          1241 |          1513
 ipackets |           17 |           17
  ibytes |          1513 |          1241
  ierrors |            0 |            0
  oerrors |            0 |            0
   Tx Bw |    582.35 bps |    709.99 bps

-Global stats enabled
Cpu Utilization : 0.8 % 0.0 Gb/core
Platform_factor : 1.0
Total-Tx       :      1.29 Kbps
Total-Rx       :      1.29 Kbps
Total-PPS      :      1.99 pps
Total-CPS      :      1.00 cps

Expected-PPS   :      2.00 pps
Expected-CPS   :      1.00 cps
Expected-BPS   :      1.30 Kbps

Active-flows   :      0 Clients :      511 Socket-util : 0.0001 %
Open-flows     :      17 Servers :      255 Socket      :      17 Socket/Clients : 0.0
drop-rate      :      0.00 bps
current time   : 18.7 sec
test duration  : 81.3 sec
```

#### ❶ Output trimmed.

Now, lets review the generated packets as they are observed by our promiscuous interface (interface #2 in the picture at the bottom).

Notice that (depending on your virtual box CPU performance), tcpdump output might be delayed.

```
[trex@localhost ~]$ sudo tcpdump -i enp0s8
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s8, link-type EN10MB (Ethernet), capture size 262144 bytes
09:38:53.953651 IP 16.0.0.2.1024 > 48.0.0.2.domain: 48 A? www.cisco.com. (31)
09:38:53.963969 IP 48.0.0.2.domain > 16.0.0.2.1024: 48* 1/0/0 A 100.100.100.100 (47)
09:38:54.960361 IP 16.0.0.3.1024 > 48.0.0.3.domain: 48 A? www.cisco.com. (31)
09:38:54.970358 IP 48.0.0.3.domain > 16.0.0.3.1024: 48* 1/0/0 A 100.100.100.100 (47)
09:38:55.967200 IP 16.0.0.4.1024 > 48.0.0.4.domain: 48 A? www.cisco.com. (31)
09:38:55.977222 IP 48.0.0.4.domain > 16.0.0.4.1024: 48* 1/0/0 A 100.100.100.100 (47)
09:38:56.975355 IP 16.0.0.5.1024 > 48.0.0.5.domain: 48 A? www.cisco.com. (31)
09:38:56.985379 IP 48.0.0.5.domain > 16.0.0.5.1024: 48* 1/0/0 A 100.100.100.100 (47)
09:38:57.981659 IP 16.0.0.6.1024 > 48.0.0.6.domain: 48 A? www.cisco.com. (31)
09:38:57.992358 IP 48.0.0.6.domain > 16.0.0.6.1024: 48* 1/0/0 A 100.100.100.100 (47)
09:38:58.990979 IP 16.0.0.7.1024 > 48.0.0.7.domain: 48 A? www.cisco.com. (31)
09:38:59.000952 IP 48.0.0.7.domain > 16.0.0.7.1024: 48* 1/0/0 A 100.100.100.100 (47)
09:39:00.009403 IP 16.0.0.8.1024 > 48.0.0.8.domain: 48 A? www.cisco.com. (31)
```

```
09:39:00.019456 IP 48.0.0.8.domain > 16.0.0.8.1024: 48* 1/0/0 A 100.100.100.100 (47)
09:39:01.015810 IP 16.0.0.9.1024 > 48.0.0.9.domain: 48 A? www.cisco.com. (31)
```

Let's have a look at another example.

We want to generate simple http traffic. The command will look like:

```
[trex@localhost v1.62]$ sudo ./t-rex-64 -f cap2/http_simple.yaml -d 100 -l 1000 -m 1 --nc
Starting TRex 1.62 please wait ...
found configuration file at /etc/trex_cfg.yaml
zmq publisher at: tcp://*:4500
```

...

❶

...

-Per port stats table

| ports    | 0           | 1         |
|----------|-------------|-----------|
| opackets | 40983       | 41946     |
| obytes   | 2563951     | 6015664   |
| ipackets | 41946       | 40983     |
| ibytes   | 6015664     | 2563951   |
| ierrors  | 0           | 0         |
| oerrors  | 0           | 0         |
| Tx Bw    | 520.83 Kbps | 1.27 Mbps |

-Global stats enabled

```
Cpu Utilization : 3.1 % 0.1 Gb/core
Platform_factor : 1.0
Total-Tx       : 1.79 Mbps
Total-Rx       : 1.79 Mbps
Total-PPS      : 2.11 Kpps
Total-CPS      : 2.84 cps

Expected-PPS   : 102.71 pps
Expected-CPS   : 2.78 cps
Expected-BPS   : 764.51 Kbps

Active-flows   : 0 Clients : 255 Socket-util : 0.0000 %
Open-flows    : 107 Servers : 65535 Socket : 0 Socket/Clients : 0.0
drop-rate     : 0.00 bps
current time  : 39.6 sec
test duration  : 60.4 sec
```

-Latency stats enabled

```
Cpu Utilization : 1.0 %
if| tx_ok , rx_ok , rx ,error, average , max , Jitter , max window
  | , , check, , latency(usec),latency (usec) ,(usec) ,
-----
0 | 39490, 39489, 0, 0, 1276 , 106714, 91 | 1737 1880
1 | 39490, 39490, 0, 0, 226 , 107619, 203 | 1694 1041
```

❶ Output trimmed.

### Note

See [TRex full manual](#) for a complete understanding of the tool features and options.

## 2.4 Updating TRex

See [Related manual](#) section

## 2.5 TRex Live monitoring

Once we have TRex up and running, we can monitor its performance using TRexViewer application (Supported only on Windows OS).

This can be done by following these steps:

1. Download the latest version of TrexViewer application and install it using [this link](#).
2. Start the application and fill in the following:
  - Trex ip: 127.0.0.1:4500
3. Click the play button.

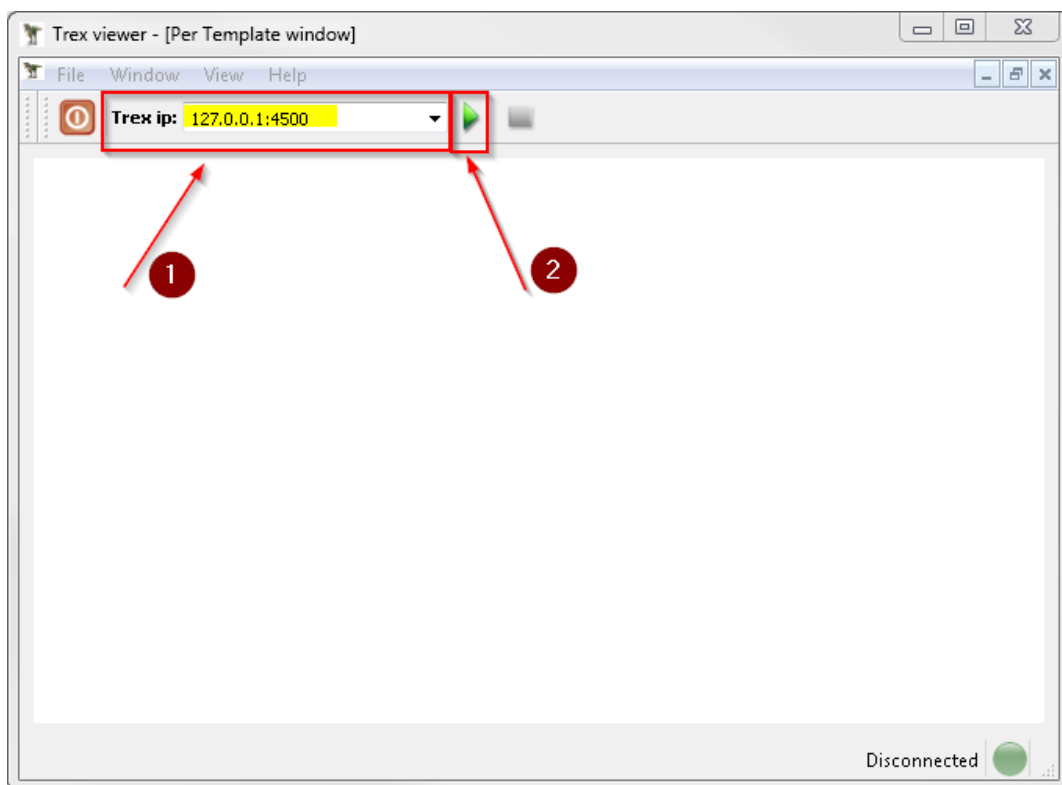


Figure 2.5: TRex viewer start screen

**That's it!**

Now the live data from TRex will be displayed on the screen.

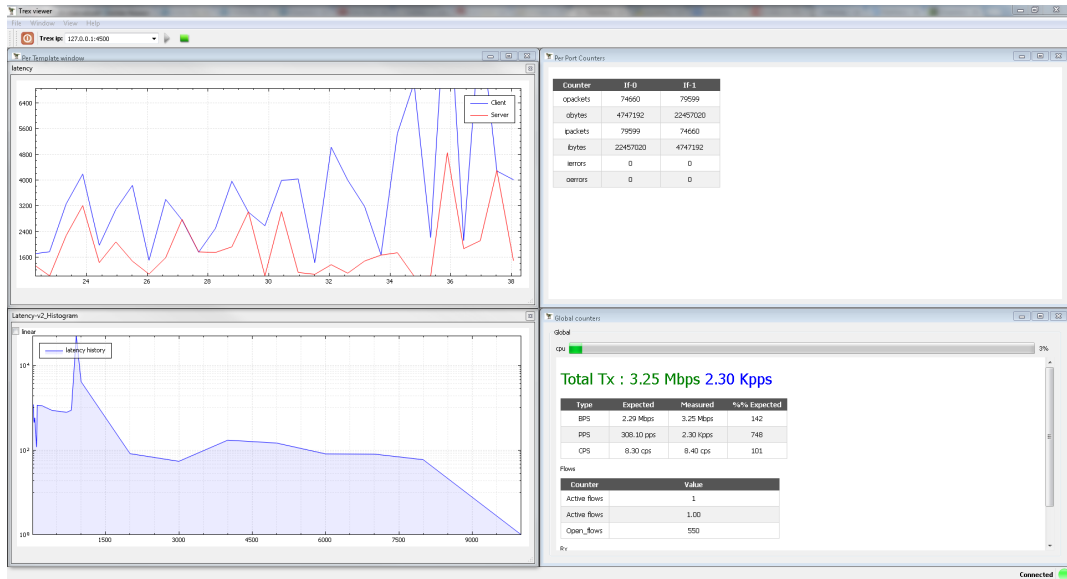


Figure 2.6: TRex viewer monitor screen

**Note**

Make sure TRex is running, otherwise data will not be available at TRexViewer.

## 2.6 Architecture and network design

Since no hardware is used, TRex simulates traffic using a virtual internal network, named *trex\_intnet*.

The following figure describes the virtual "wiring" of the virtual machine to support TRex traffic simulation.

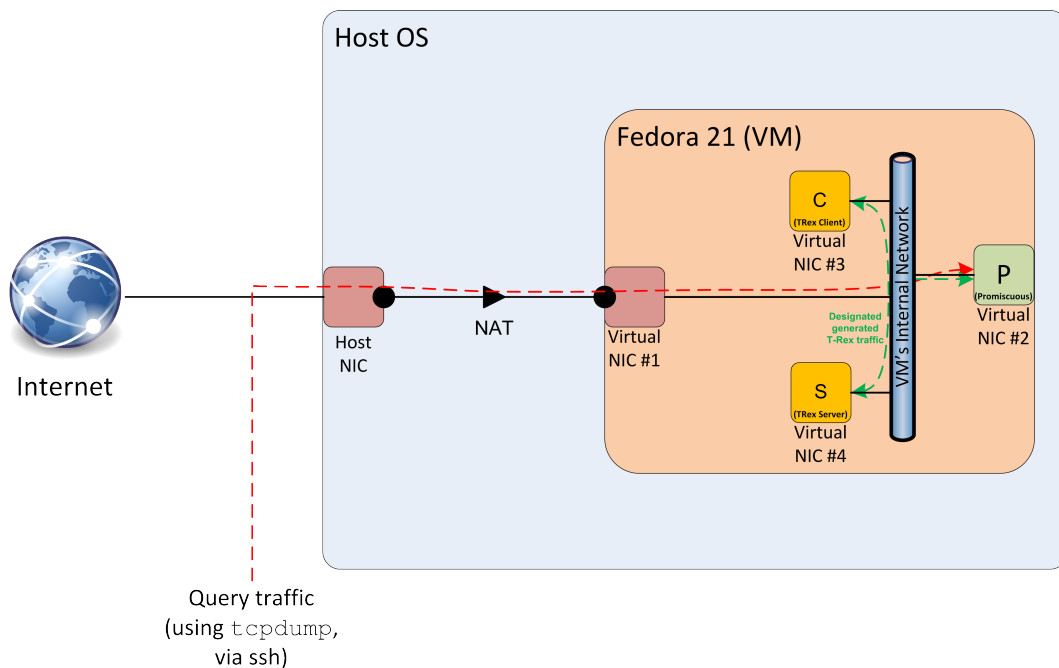


Figure 2.7: TRex virtual connectivity

The VM runs TRex with single client and single server port. The traffic generated by each of those ports is switched over the *trex\_intnet* virtual network and received by the other side.

TRex identifies only the packets which were dedicatedly sent by one of those traffic ports and receives them on the other port. Hence, packets generated by client port will be received by the server port and vice versa.

Network adapter #4 can be used for capturing all traffic generated by both of TRex's ports.