

**IT Technology**

**Networking Assignment 10**



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University College

Author

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# 1 Introduction

In this report, students will show their capability in explaining the fundamentals of a router and routing, static routes and subnets. Students will also show 2 different networks connected to a router, with established communication between them.

# 2 Audience

This document is meant for teachers and fellow students alike, with the intention of receiving peer review from these parties.

# 3 Inventory

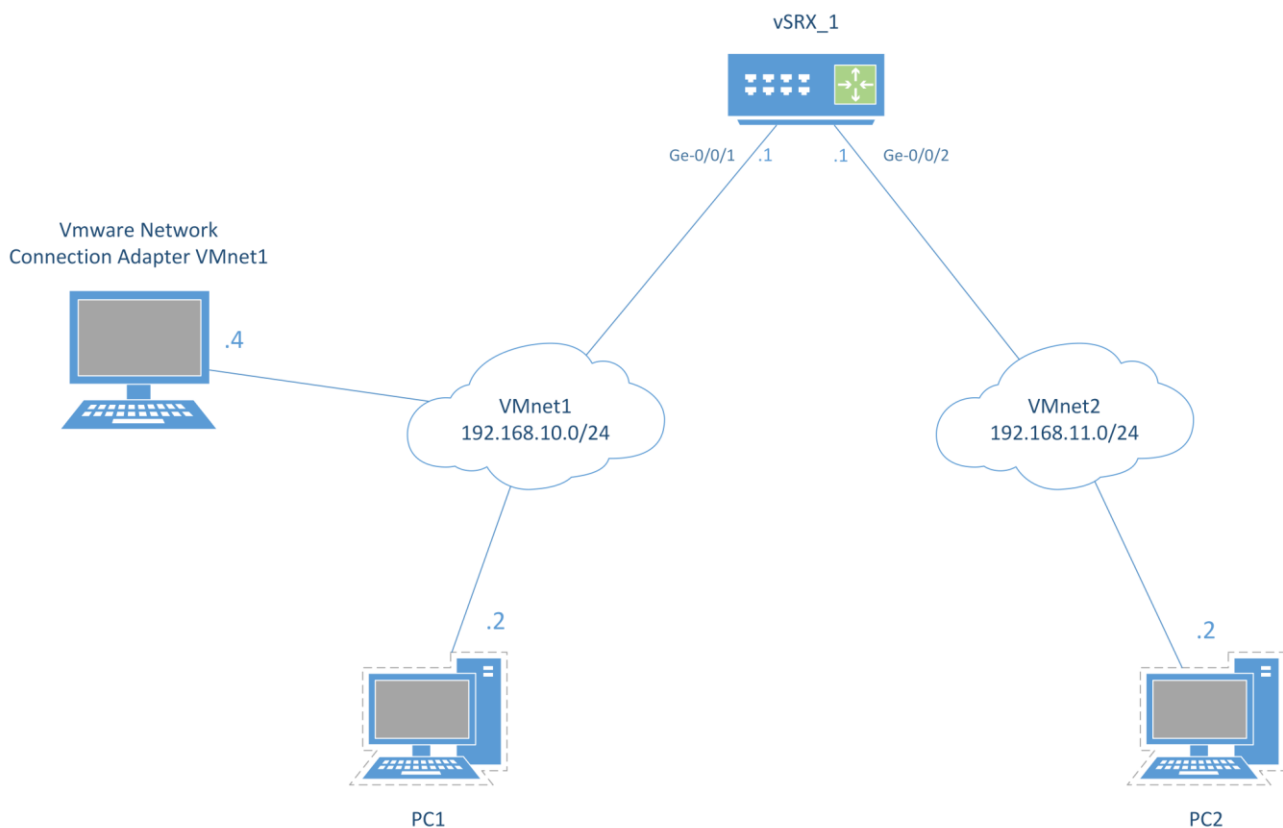
Software:

- VMWare Workstation Pro
  - Xubuntu
  - Juniper router
- Visio
- Putty

Hardware:

- Host machine

## 4 Network diagram






In the above diagram, we have a router (vSRX\_1) with 2 network connections VMnet1 and VMnet2. VMnet1 is connected to the Ge-0/0/1 interface of the router (vSRX\_1). VMnet2 is connected to the Ge-0/0/2 interface of the router (vSRX\_1). The two networks, VMnet1 and VMnet2, each has their own subnet. These subnets have 1 virtual computer connected to PC1 and PC2. VMnet1 also has a terminal connected to it. PC1 is connected to VMnet1 and PC2 is connected to VMnet2.

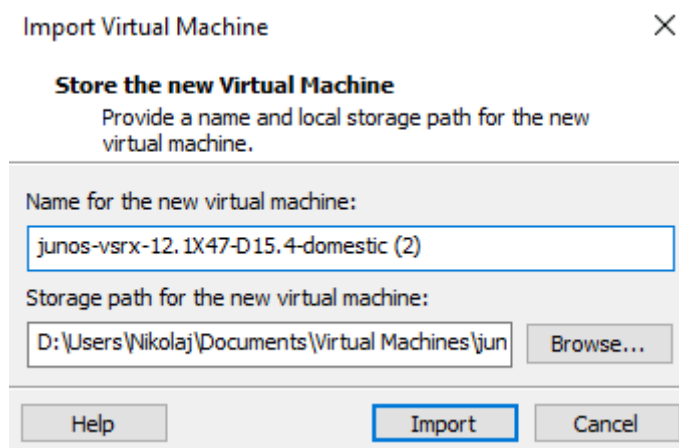
## 5 Installation of the vSRX router in VMware Workstation


Task: Screenshots and description of how to “import” the vSRX router in VMware Workstation.

The first thing to do is download the files to the users pc and then locate the downloaded files just like the screenshot below, which is needed for the installation.

 junos-vsrx-12.1X47-D15.4-domestic-disk...	18/11/2020 09.45	VMware virtual dis...	222.825 KB
 junos-vsrx-12.1X47-D15.4-domestic.ovf	18/11/2020 09.44	Open Virtualizatio...	7 KB
 junos-vsrx-12.1X47-D15.4-domestic.mf	18/11/2020 09.44	MF File	1 KB

The next thing to do is to double click on the .ovf file which opens VMware workstation and asks the user whether the user wants to import the virtual machine. Decide on the storage path for the new virtual machine, this is shown in the picture below.



 Virtual Network Editor
 ✕

Name	Type	External Connection	Host Connection	DHCP	Subnet Address
VMnet1	Host-only	-	Connected	-	192.168.10.0
VMnet2	Custom	-	-	-	192.168.11.0

Add Network...
Remove Network
Rename Network...

**VMnet Information**

☐ Bridged (connect VMs directly to the external network)
 

Bridged to: Automatic
Automatic Settings...

☐ NAT (shared host's IP address with VMs)
 NAT Settings...

☒ Host-only (connect VMs internally in a private network)

---

☒ Connect a host virtual adapter to this network
 

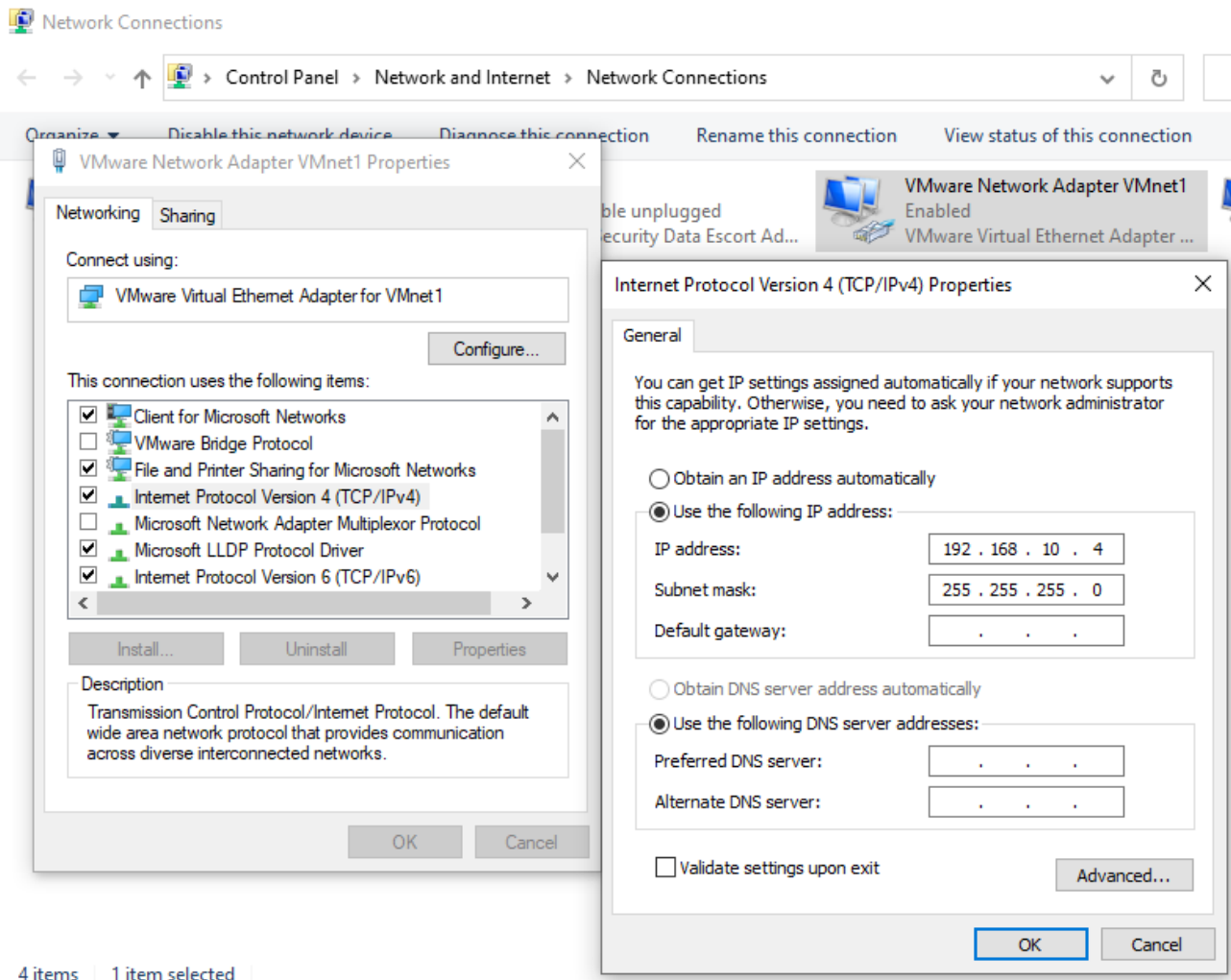
Host virtual adapter name:
 

☐ Use local DHCP service to distribute IP address to VMs
 DHCP Settings...

Subnet IP: 192 . 168 . 10 . 0
 Subnet mask: 255 . 255 . 255 . 0

Restore Defaults
Import...
Export...
OK
Cancel
Apply
Help

After this, the user now has the vSRX router as a virtual machine in VMware Workstation. To actually make it usable, the user needs to set up two virtual networks, in this case we set up VMnet1 and VMnet2, both of them set to Host-only, but only 1 of them connected with a host virtual adapter. These networks have been given the Subnet addresses 192.168.10.0/24 and 192.168.11.0/24. This is seen above.



A setup is needed for the adapter on the users host machine, to do this go to the users network connections, then go to the properties of the VMware network adapter (VMnet1), opening the IPv4 settings and set up a static ip for the adapter(192.168.10.4).



```
Command Prompt
Microsoft Windows [Version 10.0.19041.630]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Users\Nikolaj>ping 192.168.10.4

Pinging 192.168.10.4 with 32 bytes of data:
Reply from 192.168.10.4: bytes=32 time<1ms TTL=128
Reply from 192.168.10.4: bytes=32 time<1ms TTL=128
Reply from 192.168.10.4: bytes=32 time<1ms TTL=128
Reply from 192.168.10.4: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

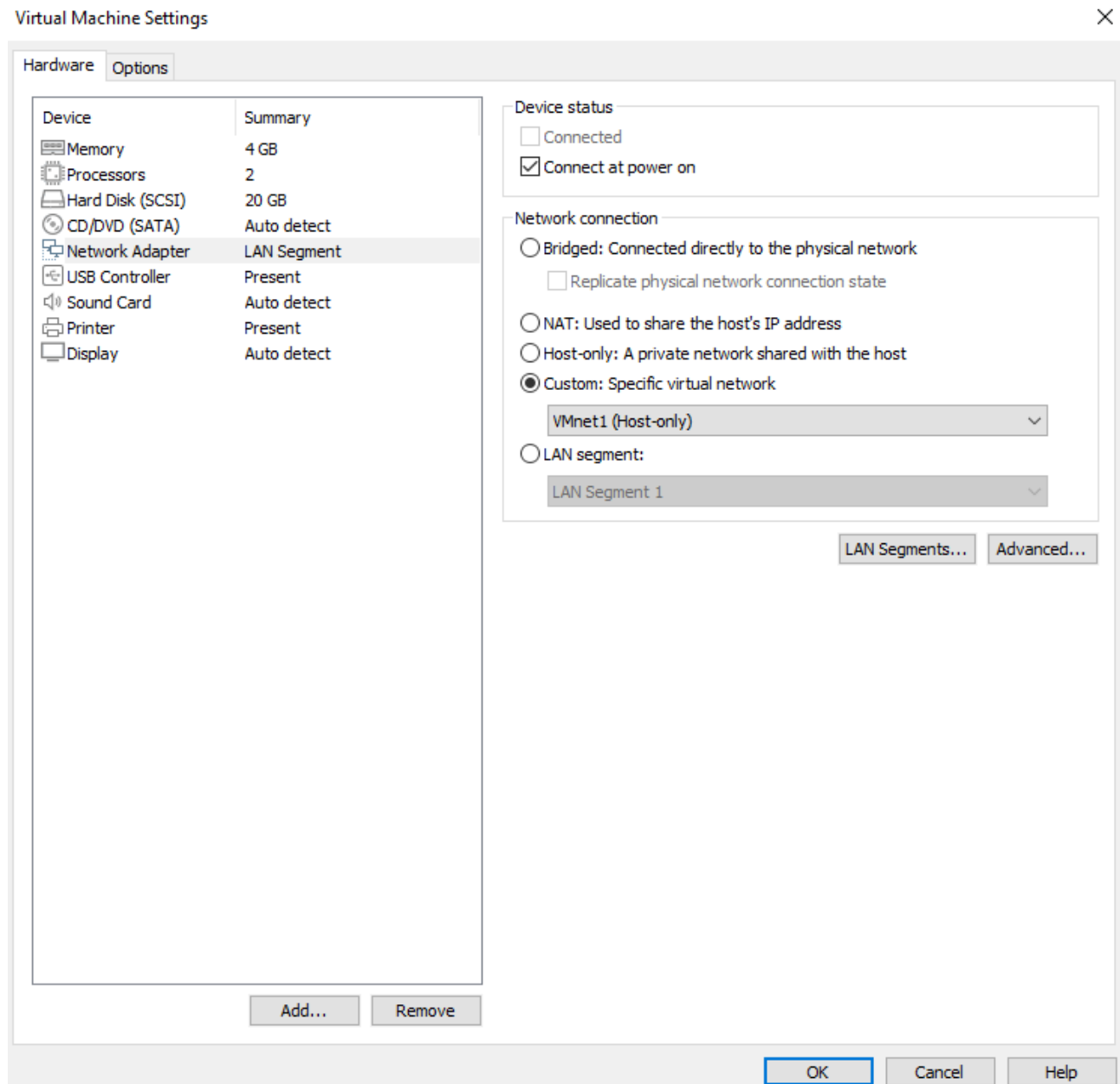
To test if the adapter is reachable, ping it.

## 6 Configuration of the PCs

Task: Very short description of how to configure the PCs.

To configure the PCs.

Select the PC, click on the network adaptor, go to custom and select the network.



As shown in the above diagram, PC1 is connected to VMnet1 and our PC2 is connected to VMnet2.

## 7 How to configure the vSRX router with static routes between the two shown subnets.

Task: One relevant screenshot and necessary descriptions of how to configure the vSRX router with static routes between the two shown subnets. Use copy/paste from the Putty Terminal to past relevant CLI commands into the hand in, instead of screenshots

Power on your router (vSRX\_1) enter root at login and enter cli at root, you will enter into router configuration state. Enter #set system host-name vSRX\_1 to enter into your router interfaces. This will be completed by entering commit and enter. At the router interface enter #set Ge-0/0/1 unit 0 family inet address 192.168.10.1/24 (ip address of interface ge-0/0/1).

The same process will be repeated for the Ge-0/0/2 interface.

Set up root password

```
[edit]
root@vSRX_1# edit interfaces

[edit interfaces]
root@vSRX_1# set ge-0/0/1 unit 0 family inet address 192.168.10.1/24

[edit interfaces]
root@vSRX_1# set ge-0/0/2 unit 0 family inet address 192.168.11.1/24

[edit interfaces]
root@vSRX_1# commit
commit complete

[edit interfaces]
root@vSRX_1#
```

On the vSRX router, enter the “edit interfaces” and set up the interfaces with static ip addresses as shown in the CLI below.

```
root@vSRX_1% cli
root@vSRX_1> edit
Entering configuration mode

[edit]
root@vSRX_1# edit interfaces

[edit interfaces]
root@vSRX_1# set ge-0/0/1 unit 0 family inet address 192.168.10.1/24

[edit interfaces]
root@vSRX_1# set ge-0/0/2 unit 0 family inet address 192.168.11.1/24

[edit interfaces]
root@vSRX_1# commit
commit complete
```

In the below CLI output, the routing table of the router is shown.

```
root@vSRX_1# run show route terse

inet.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

A Destination      P Prf  Metric 1  Metric 2  Next hop      AS path
* 192.168.10.0/24  D  0                >ge-0/0/1.0
* 192.168.10.1/32  L  0                Local
* 192.168.11.0/24  D  0                >ge-0/0/2.0
* 192.168.11.1/32  L  0                Local
```

## 8 Inter subnet PC pings(routing between the subnets)

Task: Screenshots and descriptions of inter subnet PC pings to prove that the routing by the SRX between the two subnets is working.

```
nikolaj@ubuntu:~$ ping 192.168.10.2
PING 192.168.10.2 (192.168.10.2) 56(84) bytes of data.
64 bytes from 192.168.10.2: icmp_seq=1 ttl=63 time=51.0 ms
64 bytes from 192.168.10.2: icmp_seq=2 ttl=63 time=3.28 ms
64 bytes from 192.168.10.2: icmp_seq=3 ttl=63 time=0.338 ms
64 bytes from 192.168.10.2: icmp_seq=4 ttl=63 time=0.344 ms
64 bytes from 192.168.10.2: icmp_seq=5 ttl=63 time=0.300 ms
64 bytes from 192.168.10.2: icmp_seq=6 ttl=63 time=0.317 ms
64 bytes from 192.168.10.2: icmp_seq=7 ttl=63 time=0.353 ms
64 bytes from 192.168.10.2: icmp_seq=8 ttl=63 time=0.364 ms
64 bytes from 192.168.10.2: icmp_seq=9 ttl=63 time=0.297 ms
64 bytes from 192.168.10.2: icmp_seq=10 ttl=63 time=0.292 ms
^C
--- 192.168.10.2 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9157ms
rtt min/avg/max/mdev = 0.292/5.692/51.040/15.141 ms
nikolaj@ubuntu:~$
```

In the above screenshot, we can see that a ping request has been made to PC1 from PC2. PC1s ip address 192.168.10.2 which is the destination ip address is handling the ping request. PC1 reply by sending internet control message protocol (ICMP) echo request packets, the program shows the statistical summary of the results.

## 9 Use Wireshark to show that routing is working

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	192.168.10.1	239.255.255.250	SSDP	216	M-SEARCH * HTTP/1.1
2	3.347489552	192.168.10.1	239.255.255.250	SSDP	211	M-SEARCH * HTTP/1.1
3	4.347765240	192.168.10.1	239.255.255.250	SSDP	211	M-SEARCH * HTTP/1.1
4	5.348095479	192.168.10.1	239.255.255.250	SSDP	211	M-SEARCH * HTTP/1.1
5	6.349218560	192.168.10.1	239.255.255.250	SSDP	211	M-SEARCH * HTTP/1.1
6	26.075786077	192.168.10.2	192.168.11.2	ICMP	98	Echo (ping) request id=0x0001, seq=1/256, ttl=64 (reply in 7)
7	26.081782872	192.168.11.2	192.168.10.2	ICMP	98	Echo (ping) reply id=0x0001, seq=1/256, ttl=63 (request in...)
8	27.077497502	192.168.10.2	192.168.11.2	ICMP	98	Echo (ping) request id=0x0001, seq=2/512, ttl=64 (reply in 9)
9	27.077891554	192.168.11.2	192.168.10.2	ICMP	98	Echo (ping) reply id=0x0001, seq=2/512, ttl=63 (request in...)
10	28.083720908	192.168.10.2	192.168.11.2	ICMP	98	Echo (ping) request id=0x0001, seq=3/768, ttl=64 (reply in 1...)
11	28.084081579	192.168.11.2	192.168.10.2	ICMP	98	Echo (ping) reply id=0x0001, seq=3/768, ttl=63 (request in...)
12	28.611065435	192.168.10.1	192.168.10.255	UDP	86	57621 → 57621 Len=44
13	29.108968709	192.168.10.2	192.168.11.2	ICMP	98	Echo (ping) request id=0x0001, seq=4/1024, ttl=64 (reply in ...)
14	29.109290768	192.168.11.2	192.168.10.2	ICMP	98	Echo (ping) reply id=0x0001, seq=4/1024, ttl=63 (request i...)

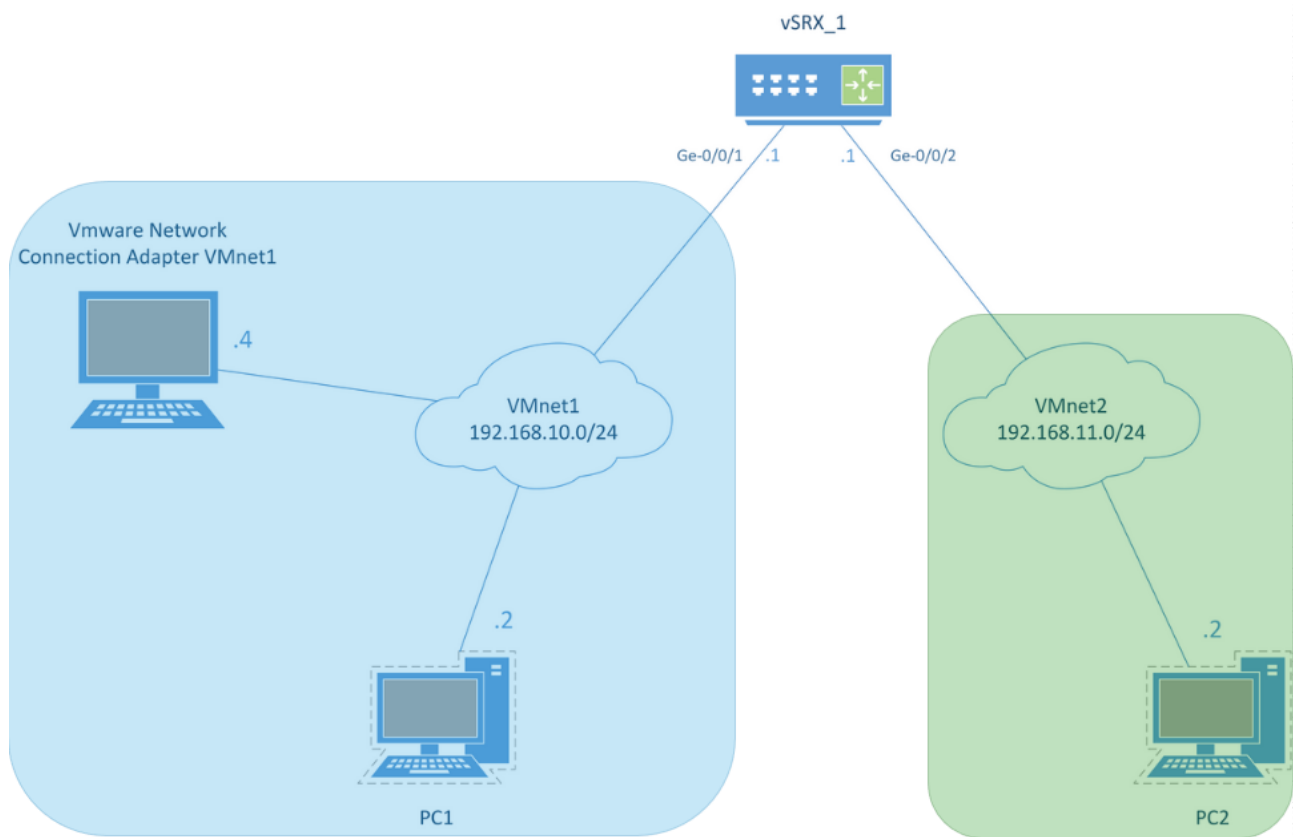
  

Frame 1: 216 bytes on wire (1728 bits), 216 bytes captured (1728 bits) on interface ens33, id 0	
Ethernet II, Src: VMware_c0:00:01 (00:50:56:c0:00:01), Dst: IPv4mcast_7f:ff:fa (01:00:5e:7f:ff:fa)	
Internet Protocol Version 4, Src: 192.168.10.1, Dst: 239.255.255.250	
User Datagram Protocol, Src Port: 54330, Dst Port: 1900	
<pre> 0000  01 00 5e 7f ff fa 00 50 56 c0 00 01 08 00 45 00  ..A...P V....E 0010  00 ca 45 6a 00 00 01 11 b9 15 c0 a8 0a 01 ef ff  ..Ej.... 0020  ff fa d4 3a 07 6c 00 b6 5f 86 4d 2d 53 45 41 52  ...:1...M-SEAR 0030  43 48 20 2a 20 48 54 54 50 2f 31 2e 31 0d 0a 48  CH * HTTP/1.1..H 0040  4f 53 54 3a 20 32 33 39 2e 32 35 35 2e 32 35 35  OST: 239.255.255 0050  2e 32 35 30 3a 31 39 30 30 0d 0a 4d 41 4e 3a 20  .250:1900-MAN: 0060  22 73 73 64 70 3a 64 69 73 63 6f 76 65 72 22 0d  "ssdp:discover". 0070  0a 4d 58 3a 20 31 0d 0a 53 54 3a 20 75 72 6e 3a  -MX: 1..ST: urn: 0080  64 69 61 6c 2d 6d 75 6c 74 69 73 63 72 65 65 6e  dial-multiscreen 0090  2d 6f 72 67 3a 73 65 72 76 69 63 65 3a 64 69 61  -org:service:dia </pre>	

In the above screenshot, we use Wireshark to show that routing is working. On the source column, you can see the IP addresses and the activities of various devices under the source column. At the top of the table, you can see that the router interface which is on IP 192.168.10.1 has SSDP protocol using multicast address for universal plug and play.

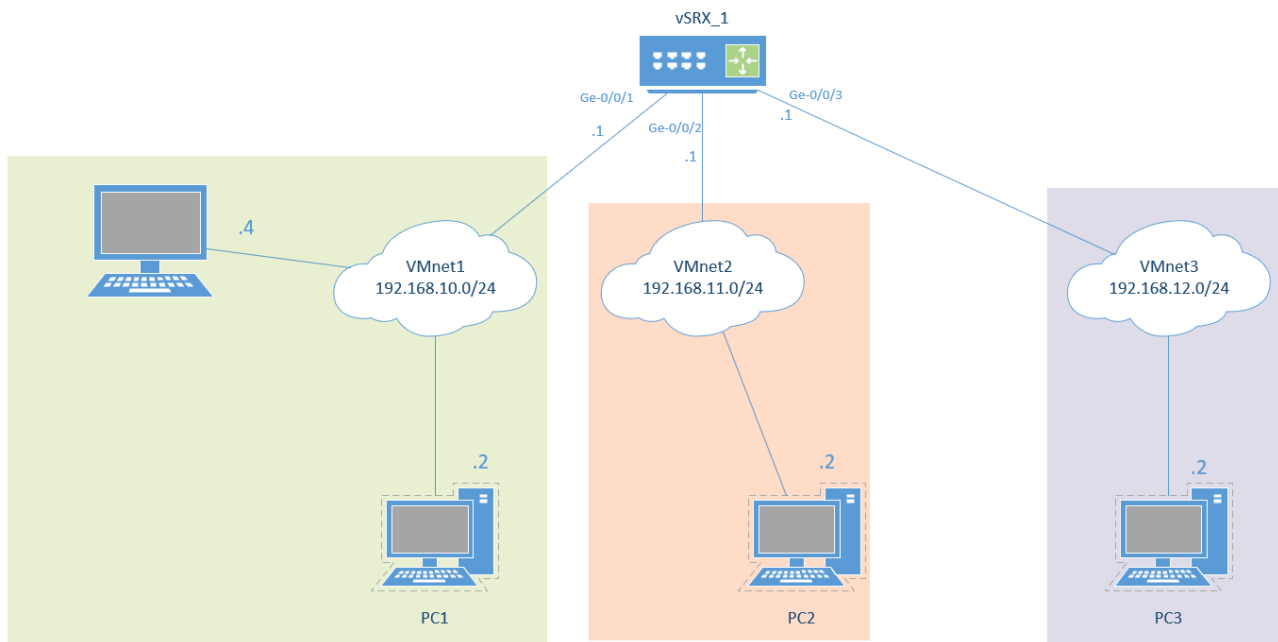
You can also see a ping request made by PC1 with IP address 192.168.10.2 (Source IP address) to PC2 with IP address 192.168.11.2 (destination IP address).

## 10 Show how many broadcast domains there are in the topology



Looking at the diagram, we have two broadcast domains. Ge-0/0/1 connection to VMnet1 has its separate broadcast domain, whilst Ge-0/0/2 connection to VMnet2 also has its own broadcast domain.

## 11 Add one more subnet. Show the network diagram for this. Document the addition of this extra subnet.



Add another virtual machine to VMware workstation. Edit the virtual machine settings for it, set the “Network Adapter” to VMnet3.

In VMware workstation, add a third network adapter to your router and name it as VMnet3, this network adapter should be the same as the new virtual machines network adapter.

On the router(vSRX\_1), add another interface “Ge-0/0/3” following the guide in [chapter 7](#) this should be linked to 192.168.12.1/24

In the new virtual machine, set up a static ip address of 192.168.12.2, on netmask 255.255.255.0 with the default gateway 192.168.12.1. Remember to restart the network driver in the machine, or restart the machine.

When this is done, the new virtual machine (PC3) is now part of the virtual network (VMnet3), as its own subnet.