SOLUTION BRIEF
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1.0	Guide for PortChannel in SONiC	Humza Altaf	Oct 15, 2023

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Introduction to PortChannel

PortChannel, also known as Link Aggregation or EtherChannel, is a network technology used to aggregate multiple physical network links into a single logical link. This approach enhances network performance, redundancy, and fault tolerance by distributing traffic across these combined links. PortChannel allows for the simultaneous use of multiple connections between network devices, such as switches and routers, providing increased bandwidth and network resilience.

Network Topology

Suppose we have a network with two hosts and an EtherChannel between two switches. We want to establish communication between these hosts by keeping them in the same VLAN.

To do this, we would need to configure our switches and hosts accordingly. Let's say we have two switches, S1 and S2, and two hosts, PC1 and PC2. Now draw network topology in GNS3 using community SONiC (version 202205) switches and hosts.
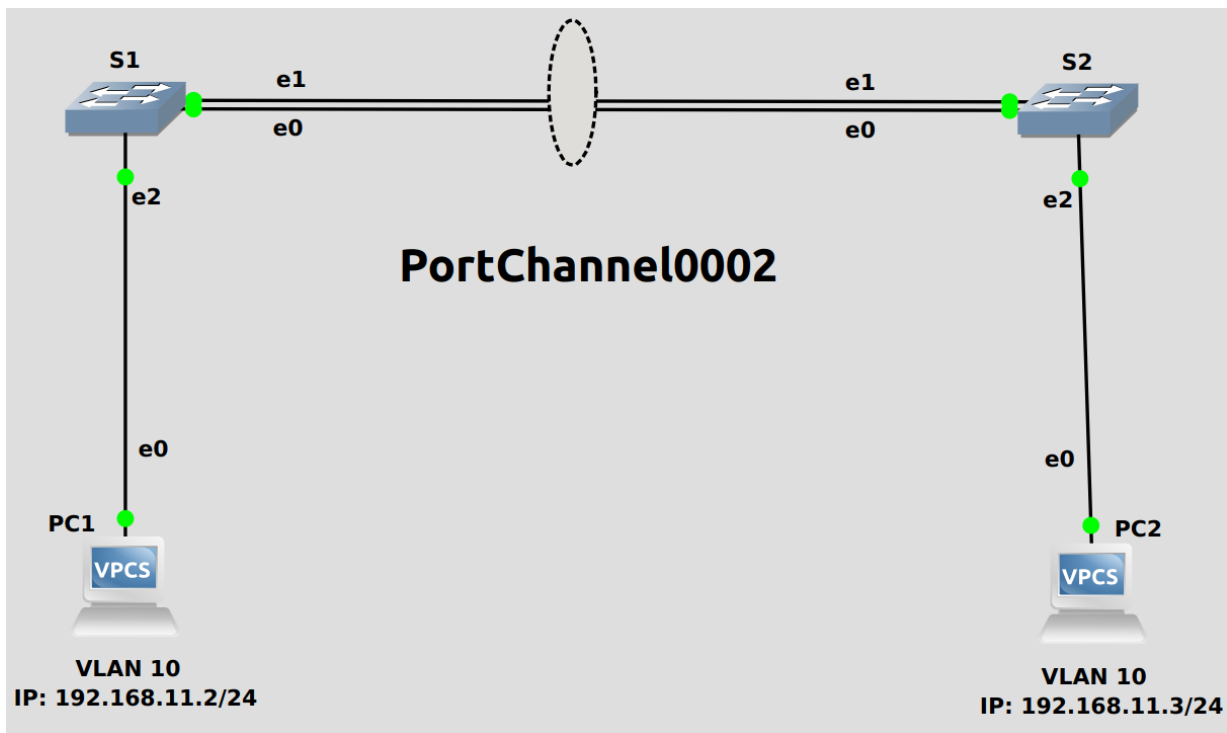
Port Mapping

GNS3	SONiC
Ethernet 0	Ethernet 0
Ethernet 1	Ethernet 4
Ethernet 2	Ethernet 8
Ethernet 3	Ethernet 12

Configurations

For the above topology, all hosts and switches are first configured before sending traffic. First, switch S1 is configured and the same steps are repeated for the switch S2. Command Reference guide is also available on GitHub for SONiC, whose link is given here.

Follow these steps to configure S1.

Step 1

Check the status of interfaces by using the command given below:

• `show interfaces status`

```
admin@sonic:~$ show interfaces status
  Interface          Lanes   Speed   MTU    FEC            Alias    Vlan   Oper   Admin   Type   Asym PFC
---------- --------------- ------- ----- ----- -------------- ------ ------ ------- ------ ----------
  Ethernet0      25,26,27,28      1G    9100    N/A    fortyGigE0/0   routed     up      up     N/A        N/A
  Ethernet4      29,30,31,32      1G    9100    N/A    fortyGigE0/4   routed     up      up     N/A        N/A
  Ethernet8      33,34,35,36      1G    9100    N/A    fortyGigE0/8   routed     up      up     N/A        N/A
```

• The administrative port refers to the settings and configurations applied by a network administrator to a specific port on a switch, while the operational port status reflects the current operational state of that port. Suppose one wants to enable a port and sets Admin Status to "up," but there is no cable connected to the port. So, it can never reach Oper Status "up" and will stay in Oper Status "down."

Step 2

By default, all interfaces are routed (L3) and IP is assigned to them. To check the status of IP addresses, use the following command given below:

• `show ip interfaces`

```
admin@sonic:~$ show ip interfaces
Interface     Master     IPv4 address/mask     Admin/Oper     BGP Neighbor     Neighbor IP
----------  --------  ------------------  -----------  -------------  ------------
Ethernet0                10.0.0.0/31          up/up        ARISTA01T2       10.0.0.1
Ethernet4                10.0.0.2/31          up/up        ARISTA02T2       10.0.0.3
```

Step 2 (Continued)

Remove the IP addresses to make that interface a switch port (L2). For this, command is given below:

- `sudo config interface ip remove/add <interface_name> <ip_addr>`

```
admin@sonic:~$ sudo config interface ip remove Ethernet0 10.0.0.0/31
admin@sonic:~$ sudo config interface ip remove Ethernet4 10.0.0.2/31
admin@sonic:~$ sudo config interface ip remove Ethernet8 10.0.0.4/31
```

Note: It is better practice to save configurations after executing two or three commands by using "sudo config save -y" command.

Step 3

Now create Portchannel between switches. Before creating Portchannel, check its status by using the following command given below:

- `show interfaces portchannel`

```
admin@sonic:~$ show interfaces portchannel
Flags: A - active, I - inactive, Up - up, Dw - Down, N/A - not available,
       S - selected, D - deselected, * - not synced
No.    Team Dev    Protocol    Ports
-----  ----------  ----------  -------
```

In the above table, no Portchannel is created, so create portchannel by using the following command given below:

- `sudo config portchannel (add | del) <portchannel_name> [--min-links <num_min_links>] [--fallback (true | false)  [--fast-rate (true | false)]`

After creating Portchannel, check its status.

```
admin@sonic:~$ sudo config portchannel add PortChannel0002
admin@sonic:~$ show interfaces portchannel
Flags: A - active, I - inactive, Up - up, Dw - Down, N/A - not available,
       S - selected, D - deselected, * - not synced
  No.  Team Dev        Protocol    Ports
-----  --------------  ----------  -------
 0002  PortChannel0002  LACP(A)(Dw)
```

Step 4

Now make ports be a member of the portchannel by using the following command given below:

- `sudo config portchannel member (add | del) <portchannel_name>  <member_portname>`

```
admin@sonic:~$ sudo config portchannel member add PortChannel0002 Ethernet0
admin@sonic:~$ sudo config portchannel member add PortChannel0002 Ethernet4
```

After making members, check the status.

```
admin@sonic:~$ show interfaces portchannel
Flags: A - active, I - inactive, Up - up, Dw - Down, N/A - not available,
       S - selected, D - deselected, * - not synced
  No.   Team Dev         Protocol      Ports
 ----- --------------- ---------- ------------------------
 0002  PortChannel0002  LACP(A)(Up)  Ethernet4(S) Ethernet0(S)
```

Note: In the above figure, the status of the ports is (S) "selected." This status will be displayed when a Portchannel is configured on both switches, and the ports are members of it.

Step 5

Now create VLAN for topology. Before creating VLAN, check the VLAN table by using the following command given below:

- `show vlan brief`

```
admin@sonic:~$ show vlan brief
+-----------+--------------+---------+----------------+-------------+
| VLAN ID   | IP Address   | Ports   | Port Tagging   | Proxy ARP   |
+===========+==============+=========+================+=============+
+-----------+--------------+---------+----------------+-------------+
```

In the above table, no VLAN is created, so create VLAN by using the following command given below:

- `sudo config vlan (add | del) <vlan_id>`

```
admin@sonic:~$ sudo config vlan add 10
admin@sonic:~$ show vlan brief
+-----------+--------------+---------+----------------+-------------+
|   VLAN ID | IP Address   | Ports   | Port Tagging   | Proxy ARP   |
+===========+==============+=========+================+=============+
|        10 |              |         |                | disabled    |
+-----------+--------------+---------+----------------+-------------+
```

Step 6

Assign VLAN to ports. In SONiC, a port can be tagged or un-tagged. Trunk ports are usually tagged while access ports are un-tagged.

- `sudo config vlan member add/del [-u|--untagged] <vlan_id> <mem- ber_portname>`

```
admin@sonic:~$ sudo config vlan member add -u 10  Ethernet8
admin@sonic:~$ sudo config vlan member add 10  PortChannel0002
```

Now check the status of the VLAN table.

```
admin@sonic:~$ show vlan brief
+------------+-------------+----------------+----------------+
|  VLAN ID  | IP Address  |  Ports         | Port Tagging   |
+===========+=============+================+================+
|       10  |             | Ethernet8      | untagged       |
|           |             | PortChannel0002 | tagged        |
```

Step 7

Repeat steps 1-6 for the switch S2.

Step 8

Assign IP addresses to hosts PC1 and PC2 by using command given below:

- `ip <ip_addr> <subnet mask>`

```
PC1> ip 192.168.11.2/24 255.255.255.0
Checking for duplicate address...
PC1 : 192.168.11.2 255.255.255.0
```

Step 8 (Continued)

After assigning IP addresses, check the status of IP address using command given below:

- `show ip`

```
PC1> sh ip

NAME         : PC1[1]
IP/MASK      : 192.168.11.2/24
GATEWAY      : 255.255.255.0
DNS          :
MAC          : 00:50:79:66:68:00
LPORT        : 10008
RHOST:PORT   : 127.0.0.1:10009
MTU          : 1500
```

Result

PC1 to PC2

Once the switches and hosts are configured, communication becomes possible among hosts in the same VLAN. As is evident from the provided figure below, PC1 is receiving a response from PC2, as both of them belong to the same VLAN. Furthermore, the TTL (Time-to-Live) value stays at 64 and remains unchanged because no routing is involved. Therefore, the Portchannel has been successfully configured.

```
PC1> ping 192.168.11.3

84 bytes from 192.168.11.3 icmp_seq=1 ttl=64 time=5.028 ms
84 bytes from 192.168.11.3 icmp_seq=2 ttl=64 time=5.433 ms
84 bytes from 192.168.11.3 icmp_seq=3 ttl=64 time=5.524 ms
84 bytes from 192.168.11.3 icmp_seq=4 ttl=64 time=5.206 ms
84 bytes from 192.168.11.3 icmp_seq=5 ttl=64 time=5.331 ms
```

PC2 to PC1

```
PC2> ping 192.168.11.2

84 bytes from 192.168.11.2 icmp_seq=1 ttl=64 time=5.457 ms
84 bytes from 192.168.11.2 icmp_seq=2 ttl=64 time=5.146 ms
84 bytes from 192.168.11.2 icmp_seq=3 ttl=64 time=5.455 ms
84 bytes from 192.168.11.2 icmp_seq=4 ttl=64 time=5.725 ms
84 bytes from 192.168.11.2 icmp_seq=5 ttl=64 time=5.092 ms
```

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References

https://github.com/sonic-net/sonic-utilities/blob/master/doc/Command-Reference.md