SKA-PSS - Network Setup for PSS Prototype

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Abstract

The installation of PSS hardware requires the deployment of new versions of the software system (OS and custom code) to a large number of nodes: MID count will be 500, and LOW 166. The manual approach to install one machine a time is of course vastly inefficient, as all nodes will share the same system, and we could have differences only in few configuration files. The PSS team chose a structured approach, with some possible alternatives. In next sections we will present the network setup of PSS Prototype, in order to gain the experience needed for the deployment of the final PSS engine.

Multiple Protonip Machines Setup

Head CentOs set-up

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Prerequisites:

i. Head machine with a CentOs 7 installation, as described in "CentOs installation" in Deployment instructions. Head Machine must have at least two network connectors. Lets call them Net0 and Net1. We assume Net0 is the first connector and Net1 the second.
ii. A working network connection to the Local Area Network (LAN, the Observatory network).
iii. A fixed IP for the Head Node, either via static assignment or fixed-lease DHCP. In the following it is assumed the second configuration. [1]
iv. Monitor, keyboard (I assume Usa-Ascii) and mouse connected to the target system

Network Set-up:

→ means select. Most menu are in text mode, so the mouse is inactive. Navigate by means of <tab> or arrows.

1) Boot the CentOs on Head Machine, then login at console with user root and password "skapss@Meerk@t"
2) Connect Head Machine's Net0 to the LAN and let Net1 disconnected.
3) On the console execute `nmcli d<return>`
   a) The command output should look of this kind:

DEVICE	TYPE	STATE	CONNECTION
eno1	ethernet	connected	eno1
enp7s1	ethernet	unavailable	--
lo	loopback	unmanaged	--

   The device name will be different from this example. Also there can be more 'unavailable' ports. To identify the connectors, one can move the Ethernet cable from Net0 and, after few seconds, give the command:
   "`ethtool <device> | grep Link`".
   This shows if the link is detected. Also `nmcli` command can be used, but it is less intuitive.
4) Label the two interfaces as Net0 and Net1. Reconnect Net0.
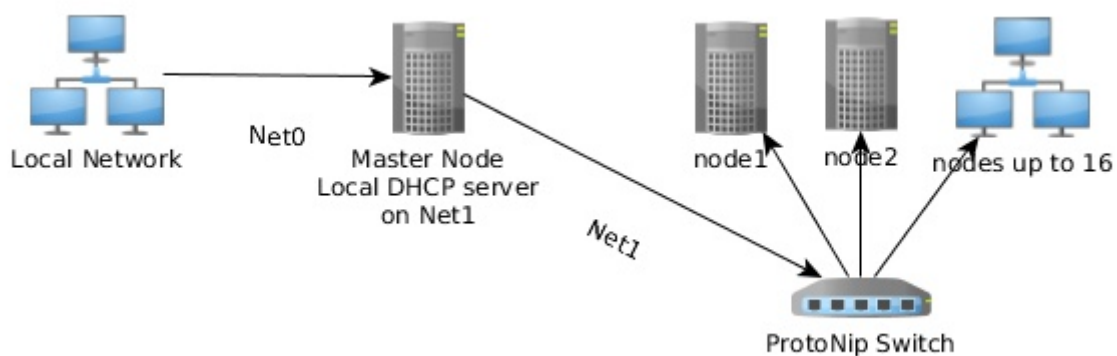5) Run "`ifconfig <Net0_device> | grep 'inet '`". Take note of inet address (Net0_IP).

From her on we will use eno1 for `<Net0_device>` and enp7s1 for `<Net1_device>` for simplicity.

6) Connect Net1
7) Move to network folder:
   a) "`cd /etc/sysconfig/network-scripts/`"
8) Save a backup of network configuration:
   a) "`cp -p ifcfg-eno1 ifcfg-eno1.sav`"
   b) "`cp -p ifcfg-enp7s1 ifcfg-enp7s1.sav`"

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1 If this is not the case, an update note will be issued.

As usual the device names can be different.

9) Edit (with vim, nano, or other editors) the `ifcfg-eno1` file updating the keywords:
   a) `BOOTPROTO="dhcp"`
   b) `DEVICE="eno1"`
   c) `ONBOOT="yes"`
10) Edit (with vim, nano, or other editors) the `ifcfg-enp7s1` file updating the keywords:
    a) `BOOTPROTO="static"`
    b) `IPADDR="10.0.0.1"`
    c) `NETMASK="255.255.0.0"`
    d) `DEVICE="enp7s1"`
    e) `ONBOOT="yes"`
11) Enable changes with:
    a) "`systemctl restart NetworkManager`"

Local Network — Net0 — Master Node Local DHCP server on Net1 — node1 — node2 — nodes up to 16 — Net1 — ProtoNip Switch

Nat Setting

12) Execute
    a) `sysctl -w net.ipv4.ip_forward=1`
13) Make permanent the change by
    a) `echo "net.ipv4.ip_forward = 1" >> /etc/sysctl.d/ip_forward.conf`
14) Execute (only one line for each command!)
    a) `firewall-cmd --direct --add-rule ipv4 nat POSTROUTING 0 -o enp7s1 -j MASQUERADE`
    b) `firewall-cmd --direct --add-rule ipv4 filter FORWARD 0 -i enp7s1 -o eno1 -j ACCEPT`
    c) `firewall-cmd --direct --add-rule ipv4 filter FORWARD 0 -i eno1 -o enp7s1 -m state --state RELATED,ESTABLISHED -j ACCEPT`
    d) `firewall-cmd --reload`

DHCP Setting

15) Install yum package:
    a) `yum install dhcp`
       Normally the process requires two confirmations, say "`yes`"
16) Enable DHCP on internal device: add to the file `/etc/sysconfig/dhcpd` the line:
    a) `DHCPDARGS=enp7s1`
17) Get the DNS IP

```
        a) grep nameserver /etc/resolv.conf | head -1
```
18) Get the dhcp.conf skeleton:
```
    a) cd /etc/dhcpd
    b) cat /usr/share/doc/dhcp*/dhcpd.conf.example >> dhcpd.conf
```
19) Edit the /etc/dhcp file until it appears as follows:
```
#
# DHCP Server Configuration file.
#   see /usr/share/doc/dhcp*/dhcpd.conf.example
#   see dhcpd.conf(5) man page
#
# dhcpd.conf
#
# Configuration for PSS proto
#

# option definitions common to all supported networks...
option domain-name "ska-pss.org";
option domain-name-servers 192.168.17.1;

default-lease-time 600;
max-lease-time 7200;

# Use this to enble / disable dynamic dns updates globally.
#ddns-update-style none;

# A configuration for an internal subnet.
subnet 10.0.0.0 netmask 255.255.0.0 {
  range 10.0.1.6 10.0.1.100;
  option routers 10.0.0.1;
  default-lease-time 600;
  max-lease-time 7200;
}

# Fixed IP addresses can also be specified for hosts.   These addresses
# should not also be listed as being available for dynamic assignment.
host node-00-10 {
  hardware ethernet 08:00:07:26:c0:a5;
  fixed-address 10.0.0.2;
}
```
20) Start the DHCP daemon
```
    a) /sbin/service dhcpd start
```
21) Verify daemon is running.
```
    a) /sbin/service dhcpd status | grep Active
```
   The answer should contain the word '`running`'
22) Start the nodes. They should get an IP address
23) On a node the commands:
```
    a) ping 10.0.0.10
    b) ping 8.8.8.8
```
   should be both successful.

Fixed Nodes addresses

To ease the use of the leaf nodes, it is useful to assign to each node a fixed address. To set up such configuration, for each machine a "`host <hostname>`" section is required. The hardware ethernet mac address can be obtained or from a label near the interface, or by the command "`ifconfig`"