# Study of ROS topics, nodes, messages and the ROS graph for running the Velodyne Lidar VLP16

For ROS Indigo, Ubuntu 14.04

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Upon connecting the Lidar to the computer (following the Lidar VLP16 Setup tutorial) and running the commands

```
roslaunch velodyne_pointcloud VLP16_points.launch
rosrun rviz rviz -f velodyne
```

with the command

```
rostopic list
```

we can see that ROS creates the following set of topics:

/clicked_point
/diagnostics
/initialpose
/move_base_simple/goal
/rosout
/rosout_agg
/tf
/tf_static
/velodyne_nodelet_manager/bond
/velodyne_nodelet_manager_cloud/parameter_descriptions
/velodyne_nodelet_manager_cloud/parameter_updates
/velodyne_nodelet_manager_driver/parameter_descriptions
/velodyne_nodelet_manager_driver/parameter_updates
/velodyne_packets
/velodyne_points

The following packages contain message types that get published and subscribed to within these topics:

actionlib
actionlib_msgs
actionlib_tutorials
beginner_tutorials
bond
control_msgs
diagnostic_msgs
driver_base
dynamic_reconfigure
gazebo_msgs
geometry_msgs
map_msgs
nav_msgs
pcl_msgs
roscpp
rosgraph_msgs
rospy_tutorials
sensor_msgs
shape_msgs
simplelessons
smach_msgs
std_msgs
stereo_msgs
tf
tf2_msgs
theora_image_transport
trajectory_msgs
turtle_actionlib
turtlesim
velodyne_msgs
visualization_msgs

The following parameters are available for configuration:

/velodyne_nodelet_manager_cloud/calibration
/velodyne_nodelet_manager_cloud/max_range
/velodyne_nodelet_manager_cloud/min_range

/velodyne_nodelet_manager_cloud/view_direction
/velodyne_nodelet_manager_cloud/view_width
/velodyne_nodelet_manager_driver/device_ip
/velodyne_nodelet_manager_driver/frame_id
/velodyne_nodelet_manager_driver/model
/velodyne_nodelet_manager_driver/pcap
/velodyne_nodelet_manager_driver/port
/velodyne_nodelet_manager_driver/read_fast
/velodyne_nodelet_manager_driver/read_once
/velodyne_nodelet_manager_driver/repeat_delay
/velodyne_nodelet_manager_driver/rpm
/velodyne_nodelet_manager_driver/time_offset

The nodes that generate velodyne's operation are all clustered inside velodyne_nodelet_manager_ , velodyne_nodelet_manager_cloud and velodyne_nodelet_manager_driver
To change any of the parameters available above, you have to call the service set_parameter:

rosservice call /velodyne_nodelet_manager_cloud/set_parameters

and then use tab completion in order for an YAML dictionary containing the parameter settings to appear.

The nodes running during the operation of the VLP16 Lidar are:

/rosout
/rviz_1485536641964020449
/velodyne_nodelet_manager
/velodyne_nodelet_manager_cloud
/velodyne_nodelet_manager_driver

The services available are:

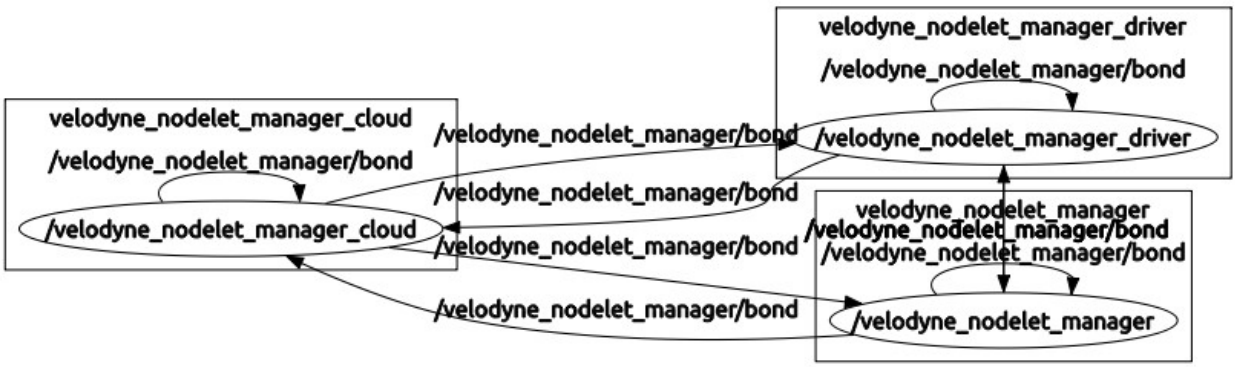
/rosout/get_loggers
/rosout/set_logger_level
/rviz_1485536641964020449/get_loggers
/rviz_1485536641964020449/reload_shaders
/rviz_1485536641964020449/set_logger_level

/velodyne_nodelet_manager/get_loggers
/velodyne_nodelet_manager/list
/velodyne_nodelet_manager/load_nodelet
/velodyne_nodelet_manager/set_logger_level
/velodyne_nodelet_manager/unload_nodelet
/velodyne_nodelet_manager_cloud/get_loggers
/velodyne_nodelet_manager_cloud/set_logger_level
/velodyne_nodelet_manager_cloud/set_parameters
/velodyne_nodelet_manager_driver/get_loggers
/velodyne_nodelet_manager_driver/set_logger_level
/velodyne_nodelet_manager_driver/set_parameters

We can call anyone of them using the command

rosservice call

The rqt_graph tool show the ROS graph that is connecting the nodes during the operation of the VLP16:




The map image that appears is broadcasted by the rviz node is generated by the velodyne_nodelet_manager node, which publishes messages on the topic velodyne_points. The publishing rate can be evaluated with the

command

```
rostopic hz /velodyne_points
```

It oscillates between 9.9 Hz and 10 Hz.