STORAGE METRICS

1. `iscsi_read_bytes{device="M:m"}`

- Total number of **bytes read** from the iSCSI device identified by major:minor (`M:m`).
- **Captured** Using the kernel tracepoint `block:block_rq_issue` when a read (`'R'`) request is issued.

- Shows how much data is being read from each iSCSI-attached disk.

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2. `iscsi_write_bytes{device="M:m"}`

- Total number of **bytes written** to the iSCSI device.

- Same tracepoint as above, but when a write (`'W'`) operation is issued.

- Helps you track write-heavy workloads or storage stress.

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3. `iscsi_read_ops{device="M:m"}`

- Number of **read operations** (IOs) performed on the iSCSI device.

- Counter is incremented each time a read event is observed at the block tracepoint.

- Helps you analyze read IOPS (input/output operations per second) over time.

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4. `iscsi_write_ops{device="M:m"}`

- Number of **write operations** (IOs) to the iSCSI device.

- Counter incremented on every write I/O detected.

- Important for measuring the write load or diagnosing write-intensive applications.

5. `iscsi_func_calls{func="iscsi_data_xmit"}`- this is kind of a branch under trace

- Number of times the `iscsi_data_xmit` kernel function was invoked.

- Attached via `kprobe` using `trace_iscsi_xmit` to track internal iSCSI packet transfers.

- Gives a low-level insight into actual iSCSI protocol activity (e.g., packets sent).

OUTPUT IN .prom file

HELP iscsi_read_bytes Total read bytes per iSCSI device

TYPE iscsi_read_bytes counter

iscsi_read_bytes{device="8:16"} 104886272

iscsi_read_bytes{device="8:32"} 104878080

HELP iscsi_write_bytes Total written bytes per iSCSI device

TYPE iscsi_write_bytes counter

iscsi_write_bytes{device="8:16"} 209969152

iscsi_write_bytes{device="8:32"} 315002880

HELP iscsi_read_ops Total read I/O operations per iSCSI device

TYPE iscsi_read_ops counter

iscsi_read_ops{device="8:16"} 23

iscsi_read_ops{device="8:32"} 21

HELP iscsi_write_ops Total write I/O operations per iSCSI device

TYPE iscsi_write_ops counter

iscsi_write_ops{device="8:16"} 58

iscsi_write_ops{device="8:32"} 178

HELP iscsi_func_calls Number of times iscsi_data_xmit was called

TYPE iscsi_func_calls counter

iscsi_func_calls{func="iscsi_data_xmit"} 1018

NETWORK METRICS

1) iSCSI LUN level

   a.iscsi_tcp_sent_bytes

   Total number of bytes sent over TCP connections to port 3260 (iSCSI target port).

   Kernel hook:Captured by attaching a kprobe to tcp_sendmsg, which is invoked whenever data is sent over a TCP socket.

   b. iscsi_tcp_recv_bytes

   Total number of bytes received over TCP connections on port 3260.

   Kernel hook:Collected by attaching a kprobe to tcp_cleanup_rbuf, which is called when TCP data is moved from the kernel buffer to user space.

   c. iscsi_tcp_retransmits

   Counts the total number of TCP retransmissions on port 3260, indicating possible packet loss or congestion.

   Kernel hook:Monitored via a kprobe on tcp_retransmit_skb, which the kernel calls when it needs to resend a packet.

   Helps you see network quality problems — high retransmissions indicate loss, congestion, or unstable links.

2) Pod/Cluster level

For slides:

->node_network_carrier_changes_total{device="cilium_host"} 2
The link state of `cilium_host` has changed 2 times (up/down).

->node_network_carrier_changes_total{device="cilium_net"} 2
The link state of `cilium_net` has changed 2 times. (transient error ? reboot machine? on link)

->node_network_info{...device="cilium_net"}
`cilium_net` interface is up, in full duplex mode, with MAC `5a:71:00:f3:c6:f7` and operational.

->node_network_info{...device="cilium_host"}
`cilium_host` interface is up, in full duplex mode, with MAC `9e:96:e0:3e:c2:21` and operational.

On Grafana dashboard

node_network_receive_bytes_total{device="cilium_host"} 6475
Total number of bytes received by `cilium_host` since boot is 6475.

node_network_receive_bytes_total{device="cilium_net"} 111059
Total bytes received by `cilium_net` is 111059. (diff b/w host vs. net)

node_network_receive_bytes_total{device="cilium_vxlan"} 1616
Total bytes received by `cilium_vxlan` is 1616.

node_network_receive_drop_total{device="cilium_host"} 0
No packets dropped on receive by `cilium_host`.

node_network_receive_drop_total{device="cilium_net"} 0
No dropped receive packets on `cilium_net`.

node_network_receive_drop_total{device="cilium_vxlan"} 0
No dropped receive packets on `cilium_vxlan`. (virtual LAN)

node_network_receive_errs_total{device="cilium_host"} 0
No receive errors occurred on `cilium_host`.

node_network_receive_errs_total{device="cilium_net"} 0
No receive errors on `cilium_net`.

node_network_receive_errs_total{device="cilium_vxlan"} 0
No receive errors on `cilium_vxlan`.

node_network_speed_bytes{device="cilium_host"} 1.25e+09
`cilium_host` interface speed is 1.25 Gbps.

node_network_speed_bytes{device="cilium_net"} 1.25e+09
`cilium_net` interface speed is 1.25 Gbps.

node_network_transmit_bytes_total{device="cilium_host"} 111059
`cilium_host` has transmitted 111059 bytes total.

node_network_transmit_bytes_total{device="cilium_net"} 6475
Bytes transmitted via `cilium_net`: 6475.

node_network_transmit_bytes_total{device="cilium_vxlan"} 1616
Total bytes sent over `cilium_vxlan`: 1616.

`node_network_transmit_drop_total{device="cilium_host"} 0`
No packets were dropped during transmit on `cilium_host`.

`node_network_transmit_drop_total{device="cilium_net"} 0`
`cilium_net` has not dropped any transmit packets.

`node_network_transmit_drop_total{device="cilium_vxlan"} 0`
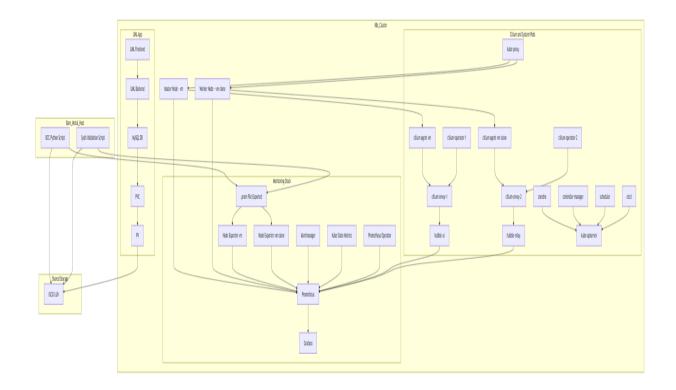No transmit drops occurred on `cilium_vxlan`.

`node_network_transmit_errs_total{device="cilium_host"} 0`
`cilium_host` has encountered 0 transmit errors.

`node_network_transmit_errs_total{device="cilium_net"} 0`
Total transmit errors on `cilium_net`: 0.

`node_network_transmit_errs_total{device="cilium_vxlan"} 0`
No transmit errors recorded on `cilium_vxlan`.

Reference:

https://docs.cilium.io/en/stable/observability/metrics/#metrics-reference

Output (by using curl in Prometheus):

curl http://localhost:9100/metrics | grep cilium

```
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed

  0     0    0     0    0     0      0      0 --:--:-- --:--:-- --:--:-- --:100 73362    0 73362    0     0  91817      0
--:--:-- --:--:-- --:--:-- 91702node_network_address_assign_type{device="cilium_host"} 3
```

node_network_address_assign_type{device="cilium_net"} 3

node_network_address_assign_type{device="cilium_vxlan"} 3

node_network_carrier{device="cilium_host"} 1

node_network_carrier{device="cilium_net"} 1

node_network_carrier{device="cilium_vxlan"} 1

node_network_carrier_changes_total{device="cilium_host"} 2

node_network_carrier_changes_total{device="cilium_net"} 2

node_network_carrier_changes_total{device="cilium_vxlan"} 0

node_network_carrier_down_changes_total{device="cilium_host"} 1

node_network_carrier_down_changes_total{device="cilium_net"} 1

node_network_carrier_down_changes_total{device="cilium_vxlan"} 0

100 173k   0 173k   0   0 216k   0 --:--:-- --:--:-- --:--:-- 216k

node_network_carrier_up_changes_total{device="cilium_host"} 1

node_network_carrier_up_changes_total{device="cilium_net"} 1

node_network_carrier_up_changes_total{device="cilium_vxlan"} 0

node_network_device_id{device="cilium_host"} 0

node_network_device_id{device="cilium_net"} 0

node_network_device_id{device="cilium_vxlan"} 0

node_network_dormant{device="cilium_host"} 0

node_network_dormant{device="cilium_net"} 0

node_network_dormant{device="cilium_vxlan"} 0

node_network_flags{device="cilium_host"} 4227

node_network_flags{device="cilium_net"} 4227

node_network_flags{device="cilium_vxlan"} 4099

node_network_iface_id{device="cilium_host"} 8

node_network_iface_id{device="cilium_net"} 7

node_network_iface_id{device="cilium_vxlan"} 33

node_network_iface_link{device="cilium_host"} 7

node_network_iface_link{device="cilium_net"} 8

node_network_iface_link{device="cilium_vxlan"} 33

```
node_network_iface_link_mode{device="cilium_host"} 0

node_network_iface_link_mode{device="cilium_net"} 0

node_network_iface_link_mode{device="cilium_vxlan"} 0

node_network_info{address="5a:71:00:f3:c6:f7",adminstate="up",broadcast="ff:ff:ff:ff:ff:ff",device
="cilium_net",duplex="full",ifalias="",operstate="up"} 1

node_network_info{address="9e:96:e0:3e:c2:21",adminstate="up",broadcast="ff:ff:ff:ff:ff:ff",devic
e="cilium_host",duplex="full",ifalias="",operstate="up"} 1

node_network_info{address="a6:59:02:fa:5d:c6",adminstate="up",broadcast="ff:ff:ff:ff:ff:ff",devic
e="cilium_vxlan",duplex="",ifalias="",operstate="unknown"} 1

node_network_mtu_bytes{device="cilium_host"} 1500

node_network_mtu_bytes{device="cilium_net"} 1500

node_network_mtu_bytes{device="cilium_vxlan"} 1500

node_network_name_assign_type{device="cilium_host"} 3

node_network_name_assign_type{device="cilium_net"} 3

node_network_name_assign_type{device="cilium_vxlan"} 3

node_network_net_dev_group{device="cilium_host"} 0

node_network_net_dev_group{device="cilium_net"} 0

node_network_net_dev_group{device="cilium_vxlan"} 0

node_network_protocol_type{device="cilium_host"} 1

node_network_protocol_type{device="cilium_net"} 1

node_network_protocol_type{device="cilium_vxlan"} 1

node_network_receive_bytes_total{device="cilium_host"} 6475

node_network_receive_bytes_total{device="cilium_net"} 111059

node_network_receive_bytes_total{device="cilium_vxlan"} 1616

node_network_receive_compressed_total{device="cilium_host"} 0

node_network_receive_compressed_total{device="cilium_net"} 0
```

```
node_network_receive_compressed_total{device="cilium_vxlan"} 0

node_network_receive_drop_total{device="cilium_host"} 0

node_network_receive_drop_total{device="cilium_net"} 0

node_network_receive_drop_total{device="cilium_vxlan"} 0

node_network_receive_errs_total{device="cilium_host"} 0

node_network_receive_errs_total{device="cilium_net"} 0

node_network_receive_errs_total{device="cilium_vxlan"} 0

node_network_receive_fifo_total{device="cilium_host"} 0

node_network_receive_fifo_total{device="cilium_net"} 0

node_network_receive_fifo_total{device="cilium_vxlan"} 0

node_network_receive_frame_total{device="cilium_host"} 0

node_network_receive_frame_total{device="cilium_net"} 0

node_network_receive_frame_total{device="cilium_vxlan"} 0

node_network_receive_multicast_total{device="cilium_host"} 0

node_network_receive_multicast_total{device="cilium_net"} 0

node_network_receive_multicast_total{device="cilium_vxlan"} 0

node_network_receive_nohandler_total{device="cilium_host"} 0

node_network_receive_nohandler_total{device="cilium_net"} 0

node_network_receive_nohandler_total{device="cilium_vxlan"} 0

node_network_receive_packets_total{device="cilium_host"} 64

node_network_receive_packets_total{device="cilium_net"} 1184

node_network_receive_packets_total{device="cilium_vxlan"} 24

node_network_speed_bytes{device="cilium_host"} 1.25e+09

node_network_speed_bytes{device="cilium_net"} 1.25e+09
```

node_network_transmit_bytes_total{device="cilium_host"} 111059

node_network_transmit_bytes_total{device="cilium_net"} 6475

node_network_transmit_bytes_total{device="cilium_vxlan"} 1616

node_network_transmit_carrier_total{device="cilium_host"} 0

node_network_transmit_carrier_total{device="cilium_net"} 0

node_network_transmit_carrier_total{device="cilium_vxlan"} 0

node_network_transmit_colls_total{device="cilium_host"} 0

node_network_transmit_colls_total{device="cilium_net"} 0

node_network_transmit_colls_total{device="cilium_vxlan"} 0

node_network_transmit_compressed_total{device="cilium_host"} 0

node_network_transmit_compressed_total{device="cilium_net"} 0

node_network_transmit_compressed_total{device="cilium_vxlan"} 0

node_network_transmit_drop_total{device="cilium_host"} 0

node_network_transmit_drop_total{device="cilium_net"} 0

node_network_transmit_drop_total{device="cilium_vxlan"} 0

node_network_transmit_errs_total{device="cilium_host"} 0

node_network_transmit_errs_total{device="cilium_net"} 0

node_network_transmit_errs_total{device="cilium_vxlan"} 0

node_network_transmit_fifo_total{device="cilium_host"} 0

node_network_transmit_fifo_total{device="cilium_net"} 0

node_network_transmit_fifo_total{device="cilium_vxlan"} 0

node_network_transmit_packets_total{device="cilium_host"} 1184

node_network_transmit_packets_total{device="cilium_net"} 64

node_network_transmit_packets_total{device="cilium_vxlan"} 24

```
node_network_transmit_queue_length{device="cilium_host"} 1000

node_network_transmit_queue_length{device="cilium_net"} 1000

node_network_transmit_queue_length{device="cilium_vxlan"} 1000

node_network_up{device="cilium_host"} 1

node_network_up{device="cilium_net"} 1

node_network_up{device="cilium_vxlan"} 0
```