

Appendix

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Flow Metrics

This section provides detailed information about each flow metric. Long names in flow metrics are used for SAN analytics and short names are used for SAN Telemetry Streaming purposes.

Note

- The *total_abts_count* flow metrics is updated only for the SCSI analytics type.
- From Cisco MDS NX-OS Release 9.2(2), the following view instances were deprecated:
  - Application View Instance (app)
  - Target Application View Instance (scsi_target_app and nvme_target_app)
  - Initiator Application View Instance (scsi_initiator_app and nvme_initiator_app)
- From Cisco MDS NX-OS Release 9.2(2), the following metrics were deprecated:
  - total_seq_read_io_count
  - total_seq_write_io_count
  - read_io_inter_gap_time_min
  - read_io_inter_gap_time_max
  - write_io_inter_gap_time_min
  - write_io_inter_gap_time_max
- From Cisco MDS NX-OS Release 9.2(2), the following metrics are introduced:
  - total_busy_period
  - write_io_first_burst_count
  - write_io_array_delay_time
  - write_io_host_delay_time
  - write_io_array_delay_time_max
  - write_io_host_delay_time_max
  - write_io_host_delay_time_min
  - multisequence_exchange_write_io_sequences_max
  - multisequence_exchange_write_io_sequences_min
  - total_write_io_sequences_count

The following is the list of supported views:

- Port View Instance (port)
- Logical Port View Instance (logical_port)
- Application View Instance (app)
- Target View Instance (scsi_target and nvme_target)
- Initiator View Instance (scsi_initiator and nvme_initiator)

- Target Application View Instance (scsi_target_app and nvme_target_app)
- Initiator Application View Instance (scsi_initiator_app and nvme_initiator_app)
- Target IT Flow View Instance (scsi_target_it_flow and nvme_target_it_flow)
- Initiator IT Flow View Instance (scsi_initiator_it_flow and nvme_initiator_it_flow)
- Target TL Flow View Instance (scsi_target_tl_flow)
- Target TN Flow View Instance (nvme_target_tn_flow)
- Initiator ITL Flow View Instance (scsi_initiator_itl_flow)
- Initiator ITN Flow View Instance (nvme_initiator_itn_flow)
- Target ITL Flow View Instance (scsi_target_itl_flow)
- Target ITN Flow View Instance (nvme_target_itn_flow)
- Initiator IO Flow View Instance (scsi_initiator_io and nvme_initiator_io)
- Target IO Flow View Instance (scsi_target_io and nvme_target_io)

List of Supported Flow Metrics

Port View Instance (port)

Table 1: Flow Metrics for Port View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
port	port	Key	Text	No	A switch port where the SAN Analytics feature is enabled.
scsi_target_count	stc	Metadata	Count	No	Number of unique SCSI target FCIDs external to a switch port with IO since last clearing of metrics.
nvme_target_count	ntc	Metadata	Count	No	Number of unique NVMe target FCIDs external to a switch port with IO since last clearing of metrics.
scsi_initiator_count	sic	Metadata	Count	No	Number of initiators external to a switch port with IO since last clearing of metrics.
nvme_initiator_count	nic	Metadata	Count	No	Number of initiators external to a switch port with IO since last clearing of metrics.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
io_app_count	IOac	Metadata	Count	No	Number of applications hosted behind a switch port with IO since last clearing of metrics.
logical_port_count	lpc	Metadata	Count	No	Number of VSANs configured on a switch port with IO since last clearing of metrics.
scsi_target_app_count	stac	Metadata	Count	No	Number of applications for which data is hosted on targets external to a switch port.
nvme_target_app_count	ntac	Metadata	Count	No	Number of applications for which data is hosted on targets external to a switch port.
scsi_initiator_app_count	siac	Metadata	Count	No	Number of applications for which data is requested by the initiators external to a switch port.
nvme_initiator_app_count	niac	Metadata	Count	No	Number of applications for which data is requested by the initiators external to a switch port.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with a switch port.
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with a switch port.
scsi_target_it_flow_count	stITfc	Metadata	Count	No	Number of IT flows associated with various targets external to a switch port.
nvme_target_it_flow_count	ntITfc	Metadata	Count	No	Number of IT flows associated with various targets external to a switch port.
scsi_initiator_it_flow_count	siITfc	Metadata	Count	No	Number of initiator-target (IT) flows associated with various initiators external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
nvme_initiator_it_flow_count	niITfc	Metadata	Count	No	Number of initiator-target (IT) flows associated with various initiators external to a switch port.
scsi_target_itl_flow_count	stITLfc	Metadata	Count	No	Number of ITL flows associated with various targets external to a switch port.
nvme_target_itn_flow_count	ntITNfc	Metadata	Count	No	Number of ITN flows associated with various targets external to a switch port.
scsi_initiator_itl_flow_count	siITLfc	Metadata	Count	No	Number of ITL flows associated with various initiators external to a switch port.
nvme_initiator_itn_flow_count	niITNfc	Metadata	Count	No	Number of ITN flows associated with various initiators external to a switch port.
scsi_target_tl_flow_count	stTLfc	Metadata	Count	No	Number of LUNs associated with various targets external to a switch port.
nvme_target_tn_flow_count	ntTNfc	Metadata	Count	No	Number of namespace IDs associated with various targets external to a switch port.
total_abts_count	totAbts	Metric	Count	Yes	Number of aborts observed.
total_read_io_count	rtIO	Metric	Count	Yes	Total **read** command data observed external to a switch port.
total_write_io_count	wtIO	Metric	Count	Yes	Total **write** command data observed external to a switch port.
total_seq_read_io_count	rstIOc	Metric	Count	No	Total sequential **read** command data observed external to a switch port.
total_seq_write_io_count	wrstIOc	Metric	Count	No	Total sequential **write** command data observed external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_read_io_time	rtIOt	Metric	Microseconds	No	Accumulated total **read** completion time for observed external to a switch port. You can use this information to compute the average read IO completion time.
total_write_io_time	wtIOt	Metric	Microseconds	No	Accumulated total **write** command completion time observed external to a switch port. You can use this information to compute the average write command completion time.
total_read_io_initiation_time	rtIOint	Metric	Microseconds	No	Accumulated total **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ commands or the first txfr_rdy for WRITE commands) observed external to a switch port. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average read IO initiation time.
total_write_io_initiation_time	wtIOint	Metric	Microseconds	No	Accumulated total **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a switch port. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average write command initiation time.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_read_io_bytes	rtIOb	Metric	Bytes	Yes	Total **read** command data that is observed external to a switch port.
total_write_io_bytes	wtIOb	Metric	Bytes	Yes	Total **write** command data observed external to a switch port.
total_read_io_inter_gap_time	rtIOigt	Metric	Microseconds	No	Accumulated total **read** command intergap time observed external to a switch port. You can use this information to compute the average read IO intergap time.
total_write_io_inter_gap_time	wtIOigt	Metric	Microseconds	No	Accumulated total **write** command intergap time observed external to a switch port. You can use this information to compute the average write command intergap time.
total_time_metric_based_read_io_count	tmrtIOc	Metric	Count	No	Total completed **read** command data observed external to a switch port.
total_time_metric_based_write_io_count	tmwtIOc	Metric	Count	No	Total completed **write** command data observed external to a switch port.
total_time_metric_based_read_io_bytes	tmrtIOb	Metric	Count	No	Total completed **read** command data observed external to a switch port, in bytes.
total_time_metric_based_write_io_bytes	tmwtIOb	Metric	Count	No	Total completed **write** command data observed external to a switch port, in bytes.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_rate	rIOr	Metric	IOs per second	Yes	The rate of **read** commands observed external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_rate	prIOr	Metric	IOs per second	No	The peak rate of **read** commands observed external to a switch port.
write_io_rate	wIOr	Metric	IOs per second	Yes	The rate of **write** commands observed external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_rate	pwIOr	Metric	IOs per second	No	The peak rate of **write** commands observed external to a switch port.
read_io_bandwidth	rIObw	Metric	Bytes per second	Yes	The **read** command bandwidth observed external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_bandwidth	prIObw	Metric	Bytes per second	No	Peak **read** command bandwidth observed external to a switch port.
write_io_bandwidth	wIObw	Metric	Bytes per second	Yes	The **write** command bandwidth observed external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_bandwidth	pwIObw	Metric	Bytes per second	No	Peak **write** command bandwidth observed external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
read_io_size_min	rIOsMi	Metric	Bytes	Yes	Minimum **read** command size observed external to a switch port.
read_io_size_max	rIOsMa	Metric	Bytes	Yes	Maximum **read** command size observed external to a switch port.
write_io_size_min	wIOsMi	Metric	Bytes	Yes	Minimum **write** command size observed external to a switch port.
write_io_size_max	wIOsMa	Metric	Bytes	Yes	Maximum **write** command size observed external to a target external to a switch port.
read_io_completion_time_min	rIOctMi	Metric	Microseconds	Yes	Minimum **read** command completion time observed external to a switch port.
read_io_completion_time_max	rIOctMa	Metric	Microseconds	Yes	Maximum **read** command completion time observed external to a switch port.
write_io_completion_time_min	wIOctMi	Metric	Microseconds	Yes	Minimum **write** command completion time observed external to a switch port.
write_io_completion_time_max	wIOctMa	Metric	Microseconds	Yes	Maximum **write** command completion time observed external to a switch port.
read_io_initiation_time_min	rIOitMi	Metric	Microseconds	Yes	Minimum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a switch port. The initiation time is sometimes referred to as **data access latency**.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_initiation_time_max	rIOitMa	Metric	Microseconds	Yes	Maximum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a switch port. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_min	wIOitMi	Metric	Microseconds	Yes	Minimum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a switch port. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_max	wIOitMa	Metric	Microseconds	Yes	Maximum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a switch port. The initiation time is sometimes referred to as **data access latency**.
read_io_inter_gap_time_min	rIOigtMi	Metric	Microseconds	Yes	Minimum **read** command intergap time observed external to a switch port. read_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_inter_gap_time_max	rIOigtMa	Metric	Microseconds	Yes	Maximum **read** command intergap time observed external to a switch port. read_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_min	wIOigtMi	Metric	Microseconds	Yes	Minimum **write** command intergap time observed external to a switch port. write_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_max	wIOigtMa	Metric	Microseconds	Yes	Maximum **write** command intergap time observed external to a switch port. write_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_aborts	rIOa	Metric	Count	Yes	Number of **read** command aborts observed external to a switch port.
write_io_aborts	wIOa	Metric	Count	Yes	Number of **write** command aborts observed external to an application that is hosted external to a switch port.
read_io_failures	rIOf	Metric	Count	Yes	Number of **read** command failures observed external to a switch port.
write_io_failures	wIOf	Metric	Count	Yes	Number of **write** command failures observed external to a switch port.
read_io_scsi_check_condition_count	rIOSchcoct	Metric	Count	No	Number of **read** command check conditions seen external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
write_io_scsi_check_condition_count	wIOSchcoct	Metric	Count	No	Number of **write** command check conditions seen external to a switch port.
read_io_scsi_busy_count	rIOsbc	Metric	Count	No	Number of **read** command busy status seen external to a switch port.
write_io_scsi_busy_count	wIOsbc	Metric	Count	No	Number of **write** command busy status seen external to a switch port.
read_io_nvme_lba_out_of_range_count	rIONLbaoorct	Metric	Count	No	Number of **read** command *lba out of range* errors seen.
write_io_nvme_lba_out_of_range_count	wIONLbaoorct	Metric	Count	No	Number of **write** command *lba out of range* errors seen.
read_io_nvme_ns_not_ready_count	rIOnNsnrc	Metric	Count	No	Number of **read** command *namespace not ready* errors seen.
write_io_nvme_ns_not_ready_count	wIOnNsnrc	Metric	Count	No	Number of **write** command *namespace not ready* errors seen.
read_io_scsi_reservation_conflict_count	rIOSrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to a switch port.
read_io_nvme_reservation_conflict_count	rIONrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to a switch port.
write_io_scsi_reservation_conflict_count	wIOSrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to a switch port.
write_io_nvme_reservation_conflict_count	wIONrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to a switch port.
read_io_scsi_queue_full_count	rIOSQfct	Metric	Count	No	Number of **read** command queue full status seen external to a switch port.
write_io_scsi_queue_full_count	wIOSQfct	Metric	Count	No	Number of **write** command queue full status seen external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.
total_busy_period	totBsy	Metric	Count	No	The total time for which the view instances have been active.
total_write_io_first_burst_count	totWrFirBu	Metric	Count	No	Accumulated total **write** command first burst observed external to a switch port.
total_write_io_array_delay_time	totWrArrDel	Metric	Count	No	Accumulated total **write** command array delays observed external to a switch port.
total_write_io_host_delay_time	totWrHosDel	Metric	Count	No	Accumulated total **write** command host delays observed external to a switch port.
total_write_io_sequences_count	totWrSeq	Metric	Count	No	Accumulated total **write** command sequences observed external to a switch port.
write_io_host_delay_time_min	wrHosDelMn	Metric	Count	No	Minimum **write** command host delays observed external to a switch port.
write_io_host_delay_time_max	wrHosDelMx	Metric	Count	No	Maximum **write** command host delays observed external to a switch port.
write_io_array_delay_time_max	wrArrDelMx	Metric	Count	No	Maximum **write** command array delays observed external to a switch port.
multisequence_exchange_write_io_sequences_min	wrIoSeqMn	Metric	Count	No	Minimum **write** command multisequence exchange sequences observed external to a switch port.
multisequence_exchange_write_io_sequences_max	wrIoSeqMx	Metric	Count	No	Maximum **write** command multisequence exchange sequences observed external to a switch port.

Logical Port View Instance (logical_port)

Table 2: Flow Metrics for Logical Port View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
port	port	Key	Text	No	A switch port where the SAN Analytics feature is enabled.
vsan	vsan	Key	Number	No	VSAN that is configured on a switch port with IO since last clearing of metrics.
scsi_target_count	stc	Metadata	Count	No	Number of targets external to a switch port with IO since last clearing of metrics.
nvme_target_count	ntc	Metadata	Count	No	Number of targets external to a switch port with IO since last clearing of metrics.
scsi_initiator_count	sic	Metadata	Count	No	Number of initiators external to a switch port with IO since last clearing of metrics.
nvme_initiator_count	nic	Metadata	Count	No	Number of initiators external to a switch port with IO since last clearing of metrics.
scsi_target_app_count	stac	Metadata	Count	No	Number of applications for which data is hosted on targets external to a switch port.
nvme_target_app_count	ntac	Metadata	Count	No	Number of applications for which data is hosted on targets external to a switch port.
scsi_initiator_app_count	siac	Metadata	Count	No	Number of applications for which data is requested by the initiators external to a switch port.
nvme_initiator_app_count	niac	Metadata	Count	No	Number of applications for which data is requested by the initiators external to a switch port.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with a switch port.
scsi_target_it_flow_count	stITfc	Metadata	Count	No	Number of IT flows associated with various targets external to a switch port.
nvme_target_it_flow_count	ntITfc	Metadata	Count	No	Number of IT flows associated with various targets external to a switch port.
scsi_initiator_it_flow_count	siITfc	Metadata	Count	No	Number of initiator-target (IT) flows associated with various initiators external to a switch port.
nvme_initiator_it_flow_count	niITfc	Metadata	Count	No	Number of initiator-target (IT) flows associated with various initiators external to a switch port.
scsi_target_itl_flow_count	stITLfc	Metadata	Count	No	Number of ITL flows associated with various targets external to a switch port.
nvme_target_itn_flow_count	ntITNfc	Metadata	Count	No	Number of ITN flows associated with various targets external to a switch port.
scsi_initiator_itl_flow_count	siITLfc	Metadata	Count	No	Number of ITL flows associated with various initiators external to a switch port.
nvme_initiator_itn_flow_count	niITNfc	Metadata	Count	No	Number of ITN flows associated with various initiators external to a switch port.
scsi_target_tl_flow_count	stTLfc	Metadata	Count	No	Number of LUNs associated with various targets external to a switch port.
nvme_target_tn_flow_count	ntTNfc	Metadata	Count	No	Number of namespace IDs associated with various targets external to a switch port.
total_abts_count	totAbts	Metric	Count	Yes	Number of aborts observed.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_read_io_count	rtIO	Metric	Count	Yes	Total **read** command data observed external to a switch port.
total_write_io_count	wtIO	Metric	Count	Yes	Total **write** command data observed external to a switch port.
total_seq_read_io_count	rstIOc	Metric	Count	No	Total sequential **read** command data observed external to a switch port.
total_seq_write_io_count	wrstIOc	Metric	Count	No	Total sequential **write** command data observed external to a switch port.
total_read_io_time	rtIOt	Metric	Microseconds	No	Accumulated total **read** command completion time for read command data observed external to a switch port. You can use this information to compute the average read IO completion time.
total_write_io_time	wtIOt	Metric	Microseconds	No	Accumulated total **write** command completion time observed external to a switch port. You can use this information to compute the average write command completion time.
total_read_io_initiation_time	rtIOint	Metric	Microseconds	No	Accumulated total **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ commands or the first txfr_rdy for WRITE commands) observed external to a switch port. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average read IO initiation time.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_initiation_time	wtIOint	Metric	Microseconds	No	Accumulated total **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a switch port. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average write command initiation time.
total_read_io_bytes	rtIOb	Metric	Bytes	Yes	Total **read** command data that is observed external to a switch port.
total_write_io_bytes	wtIOb	Metric	Bytes	Yes	Total **write** command data observed external to a switch port.
total_read_io_inter_gap_time	rtIOigt	Metric	Microseconds	No	Accumulated total **read** command intergap time observed external to a switch port. You can use this information to compute the average read IO intergap time.
total_write_io_inter_gap_time	wtIOigt	Metric	Microseconds	No	Accumulated total **write** command intergap time observed external to a switch port. You can use this information to compute the average write command intergap time.
total_time_metric_based_read_io_count	tmrtIOc	Metric	Count	No	Total completed **read** command data observed external to a switch port.
total_time_metric_based_write_io_count	tmwtIOc	Metric	Count	No	Total completed **write** command data observed external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
total_time_metric_based_read_io_bytes	tmrtIOb	Metric	Count	No	Total completed **read** command data observed external to a switch port, in bytes.
total_time_metric_based_write_io_bytes	tmwtIOb	Metric	Count	No	Total completed **write** command data observed external to a switch port, in bytes.
read_io_rate	rIOr	Metric	IOs per second	Yes	The rate of **read** commands observed external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_rate	prIOr	Metric	IOs per second	No	The peak rate of **read** command observed, external to a LUN, on a target external to a switch port.
write_io_rate	wIOr	Metric	IOs per second	Yes	The rate of **write** commands observed external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_rate	pwIOr	Metric	IOs per second	No	The peak rate of **write** commands observed, external to a LUN, on a target external to a switch port.
read_io_bandwidth	rIObw	Metric	Bytes per second	Yes	The **read** command bandwidth observed external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
peak_read_io_bandwidth	prIObw	Metric	Bytes per second	No	Peak read command bandwidth observed, external to a logical-unit-number (LUN), on a target external to a switch port.
write_io_bandwidth	wIObw	Metric	Bytes per second	Yes	The **write** command bandwidth observed external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_bandwidth	pwIObw	Metric	Bytes per second	No	Peak **write** command bandwidth observed, external to a LUN, on a target external to a switch port.
read_io_size_min	rIOsMi	Metric	Bytes	Yes	Minimum **read** command size observed external to a switch port.
read_io_size_max	rIOsMa	Metric	Bytes	Yes	Maximum **read** command size observed external to a switch port.
write_io_size_min	wIOsMi	Metric	Bytes	Yes	Minimum **write** command size observed external to a switch port.
write_io_size_max	wIOsMa	Metric	Bytes	Yes	Maximum **write** command size observed external to a target external to a switch port.
read_io_completion_time_min	rIOctMi	Metric	Microseconds	Yes	Minimum **read** command completion time observed external to a switch port.
read_io_completion_time_max	rIOctMa	Metric	Microseconds	Yes	Maximum read-command-completion time observed external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
read_io_initiation_time_min	rIOitMi	Metric	Microseconds	Yes	Minimum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a switch port. The initiation time is sometimes referred to as **data access latency**.
read_io_initiation_time_max	rIOitMa	Metric	Microseconds	Yes	Maximum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a switch port. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_min	wIOitMi	Metric	Microseconds	Yes	Minimum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a switch port. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_max	wIOitMa	Metric	Microseconds	Yes	Maximum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a switch port. The initiation time is sometimes referred to as **data access latency**.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_inter_gap_time_min	rIOigtMi	Metric	Microseconds	Yes	Minimum **read** command intergap time observed external to a switch port. read_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_inter_gap_time_max	rIOigtMa	Metric	Microseconds	Yes	Maximum **read** command intergap time observed external to a switch port. read_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_min	wIOigtMi	Metric	Microseconds	Yes	Minimum **write** command intergap time observed external to a switch port. write_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_max	wIOigtMa	Metric	Microseconds	Yes	Maximum **write** command intergap time observed external to a switch port. write_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_aborts	rIOa	Metric	Count	Yes	Number of **read** command aborts observed external to a switch port.
write_io_aborts	wIOa	Metric	Count	Yes	Number of **write** command aborts observed external to an application that is hosted behind a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_failures	rIOf	Metric	Count	Yes	Number of **read** command failures observed external to a switch port.
write_io_failures	wIOf	Metric	Count	Yes	Number of **write** command failures observed external to a switch port.
read_io_scsi_check_condition_count	rIOSchcoct	Metric	Count	No	Number of **read** command check conditions seen external to a switch port.
write_io_scsi_check_condition_count	wIOSchcoct	Metric	Count	No	Number of **write** command check conditions seen external to a switch port.
read_io_scsi_busy_count	rIOsbc	Metric	Count	No	Number of **read** command busy status seen external to a switch port.
write_io_scsi_busy_count	wIOsbc	Metric	Count	No	Number of **write** command busy status seen external to a switch port.
read_io_nvme_lba_out_of_range_count	rIONLbaoorct	Metric	Count	No	Number of **read** command *lba out of range* errors seen.
write_io_nvme_lba_out_of_range_count	wIONLbaoorct	Metric	Count	No	Number of **write** command *lba out of range* errors seen.
read_io_nvme_ns_not_ready_count	rIOnNsnrc	Metric	Count	No	Number of **read** command *namespace not ready* errors seen.
write_io_nvme_ns_not_ready_count	wIOnNsnrc	Metric	Count	No	Number of **write** command *namespace not ready* errors seen.
read_io_scsi_reservation_conflict_count	rIOSrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to a switch port.
read_io_nvme_reservation_conflict_count	rIONrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to a switch port.
write_io_scsi_reservation_conflict_count	wIOSrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
write_io_nvme_reservation_conflict_count	wIONrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to a switch port.
read_io_scsi_queue_full_count	rIOSQfct	Metric	Count	No	Number of **read** command queue full status seen external to a switch port.
write_io_scsi_queue_full_count	wIOSQfct	Metric	Count	No	Number of **write** command queue full status seen external to a switch port.
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.
total_busy_period	totBsy	Metric	Count	No	The total time for which the view instances have been active.
total_write_io_first_burst_count	totWrFirBu	Metric	Count	No	Accumulated total **write** command first burst observed external to a switch port.
total_write_io_array_delay_time	totWrArrDel	Metric	Count	No	Accumulated total **write** command array delays observed external to a switch port.
total_write_io_host_delay_time	totWrHosDel	Metric	Count	No	Accumulated total **write** command host delays observed external to a switch port.
total_write_io_sequences_count	totWrSeq	Metric	Count	No	Accumulated total **write** command sequences observed external to a switch port.
write_io_host_delay_time_min	wrHosDelMn	Metric	Count	No	Minimum **write** command host delays observed external to a switch port.
write_io_host_delay_time_max	wrHosDelMx	Metric	Count	No	Maximum **write** command host delays observed external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_array_delay_time_max	wrArrDelMx	Metric	Count	No	Maximum **write** command array delays observed external to a switch port.
multisequence_exchange_write_io_sequences_min	wrIoSeqMn	Metric	Count	No	Minimum **write** command multisequence exchange sequences observed external to a switch port.
multisequence_exchange_write_io_sequences_max	wrIoSeqMx	Metric	Count	No	Maximum **write** command multisequence exchange sequences observed external to a switch port.

Application View Instance (app)

Table 3: Flow Metrics for Application View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
port	port	Key	Text	No	A switch port where the SAN Analytics feature is enabled.
app_id	app_id	Key	Count	No	Application identifier for the application external to a switch port.
scsi_target_itl_flow_count	stITLfc	Metadata	Count	No	Number of target ITL flows associated with an application external to a switch port.
nvme_target_itn_flow_count	ntITNfc	Metadata	Count	No	Number of ITN flows associated with various targets external to a switch port.
scsi_initiator_itl_flow_count	siITLfc	Metadata	Count	No	Number of initiator ITL flows associated with an application external to a switch port.
nvme_initiator_itn_flow_count	niITNfc	Metadata	Count	No	Number of ITN flows associated with various initiators external to a switch port.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with an application external to a switch port.
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with an application external to a switch port.
scsi_target_app_count	stac	Metadata	Count	No	Number of targets that host data for an application external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
nvme_target_app_count	ntac	Metadata	Count	No	Number of applications for which data is hosted on targets external to a switch port.
scsi_initiator_app_count	siac	Metadata	Count	No	Number of initiators that access data from an application external to a switch port.
nvme_initiator_app_count	niac	Metadata	Count	No	Number of applications for which data is requested by the initiators external to a switch port.
scsi_target_tl_flow_count	stTLfc	Metadata	Count	No	Number of LUNs associated with an application external to a switch port.
nvme_target_tn_flow_count	ntTNfc	Metadata	Count	No	Number of namespace IDs associated with various targets external to a switch port.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.

Target View Instance (scsi_target and nvme_target)

Table 4: Flow Metrics for Target View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
port	port	Key	Text	No	A switch port where the SAN Analytics feature is enabled.
vsan	vsan	Key	Count	No	VSAN configured on a switch port with IO since last clearing of metrics.
target_id	did	Key	Text	No	Target Fibre Channel ID that is external to a switch port with IO since last clearing of metrics.
scsi_target_app_count	stac	Metadata	Count	No	Number of applications for which data is hosted on a target external to a switch port.
nvme_target_app_count	ntac	Metadata	Count	No	Number of applications for which data is hosted on targets external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
scsi_target_lun_count	stLc	Metadata	Count	No	Number of LUNs seen on a target external to a switch port.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with a target external to a switch port.
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with a target external to a switch port.
scsi_target_entity_it_flow_count	stITfc	Metadata	Count	No	Number of IT flows associated with a target external to a switch port.
nvme_target_entity_it_flow_count	ntITfc	Metadata	Count	No	Number of IT flows associated with a target external to a switch port.
scsi_target_entity_itl_flow_count	stITLfc	Metadata	Count	No	Number of ITL flows associated with a target external to a switch port.
nvme_target_entity_itn_flow_count	ntITNfc	Metadata	Count	No	Number of ITN flows associated with a target external to a switch port.
total_abts_count	totAbts	Metric	Count	Yes	Number of aborts observed.
total_read_io_count	rtIO	Metric	Count	Yes	Total **read** command data observed external to a target external to a switch port.
total_write_io_count	wtIO	Metric	Count	Yes	Total **write** command data observed external to a target external to a switch port.
total_seq_read_io_count	rstIOc	Metric	Count	No	Total sequential **read** command data observed external to a target external to a switch port.
total_seq_write_io_count	wrstIOc	Metric	Count	No	Total sequential **write** command data observed external to a target external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
total_read_io_time	rtIOt	Metric	Microseconds	No	Accumulated total **read** command completion time observed external to a target external to a switch port. You can use this information to compute the average read IO completion time.
total_write_io_time	wtIOt	Metric	Microseconds	No	Accumulated total **write** command completion time observed external to a target external to a switch port. You can use this information to compute average **write** command completion time.
total_read_io_initiation_time	rtIOint	Metric	Microseconds	No	Accumulated total **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ commands or the first txfr_rdy for WRITE commands) observed external to a target external to a switch port. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute average read IO initiation time.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_initiation_time	wtIOint	Metric	Microseconds	No	Accumulated total **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target external to a switch port. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute average **write** command initiation time.
total_read_io_bytes	rtIOb	Metric	Bytes	Yes	Total **read** command data that is observed external to a target external to a switch port.
total_write_io_bytes	wtIOb	Metric	Bytes	Yes	Total **write** command data observed external to a target external to a switch port.
total_read_io_inter_gap_time	rtIOigt	Metric	Microsecond	No	Accumulated total **read** command intergap time observed external to a target external to a switch port. You can use this information to compute average read IO intergap time.
total_write_io_inter_gap_time	wtIOigt	Metric	Microseconds	No	Accumulated total **write** command intergap time data observed external to a target external to a switch port. You can use this information to compute average **write** command intergap time.
total_time_metric_based_read_io_count	tmrtIOc	Metric	Count	No	Total completed **read** command data observed external to a target external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
total_time_metric_based_write_io_count	tmwtIOc	Metric	Count	No	Total completed **write** command data observed external to a target external to a switch port.
total_time_metric_based_read_io_bytes	tmrtIOb	Metric	Count	No	Total completed **read** command data observed external to a target external to a switch port, in bytes.
total_time_metric_based_write_io_bytes	tmwtIOb	Metric	Count	No	Total completed **write** command data observed external to a target external to a switch port, in bytes.
read_io_rate	rIOr	Metric	IOs per second	Yes	The rate of **read** commands observed external to a target external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_rate	prIOr	Metric	IOs per second	No	The peak rate of **read** commands observed external to a target external to a switch port.
write_io_rate	wIOr	Metric	IOs per second	Yes	The rate of **write** commands observed external to a target external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_rate	pwIOr	Metric	IOs per second	No	The peak rate of **write** commands observed external to a target external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_bandwidth	rIObw	Metric	Bytes per second	Yes	The **read** command bandwidth observed external to a target external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_bandwidth	prIObw	Metric	Bytes per second	No	Peak **read** command bandwidth observed external to a target external to a switch port.
write_io_bandwidth	wIObw	Metric	Bytes per second	Yes	The **write** command bandwidth observed external to a target external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_bandwidth	pwIObw	Metric	Bytes per second	No	Peak **write** command bandwidth observed external to a target external to a switch port.
read_io_size_min	rIOsMi	Metric	Bytes	Yes	Minimum **read** command size observed external to a target external to a switch port.
read_io_size_max	rIOsMa	Metric	Bytes	Yes	Maximum **read** command size observed external to a target external to a switch port.
write_io_size_min	wIOsMi	Metric	Bytes	Yes	Minimum **write** command size observed external to a target external to a switch port.
write_io_size_max	wIOsMa	Metric	Bytes	Yes	Maximum **write** command size observed external to a target external to a switch port.
read_io_completion_time_min	rIOctMi	Metric	Microseconds	Yes	Minimum **read** command completion time observed external to a target external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
read_io_completion_time_max	rIOctMa	Metric	Microseconds	Yes	Maximum **read** command completion time observed external to a target external to a switch port.
write_io_completion_time_min	wIOctMi	Metric	Microseconds	Yes	Minimum **write** command completion time observed external to a target external to a switch port.
write_io_completion_time_max	wIOctMa	Metric	Microseconds	Yes	Maximum **write** command completion time observed external to a target external to a switch port.
read_io_initiation_time_min	rIOitMi	Metric	Microseconds	Yes	Minimum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target external to a switch port. The initiation time is sometimes referred to as **data access latency**.
read_io_initiation_time_max	rIOitMa	Metric	Microseconds	Yes	Maximum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target external to a switch port. The initiation time is sometimes referred to as **data access latency**.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_initiation_time_min	wIOitMi	Metric	Microseconds	Yes	Minimum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target external to a switch port. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_max	wIOitMa	Metric	Microseconds	Yes	Maximum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target external to a switch port. The initiation time is sometimes referred to as **data access latency**.
read_io_inter_gap_time_min	rIOigtMi	Metric	Microsecond	Yes	Minimum **read** command intergap time observed external to a target external to a switch port. read_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_inter_gap_time_max	rIOigtMa	Metric	Microsecond	Yes	Maximum **read** command intergap time observed external to a target external to a switch port. read_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_inter_gap_time_min	wIOigtMi	Metric	Microseconds	Yes	Minimum **write** command intergap time observed external to a target external to a switch port. write_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_max	wIOigtMa	Metric	Microseconds	Yes	Maximum **write** command intergap time observed external to a target external to a switch port. write_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_aborts	rIOa	Metric	Count	Yes	Number of **read** command aborts observed external to a target external to a switch port.
write_io_aborts	wIOa	Metric	Count	Yes	Number of **write** command aborts observed external to a target external to a switch port.
read_io_failures	rIOf	Metric	Count	Yes	Number of read-command failures observed external to a target external to a switch port.
write_io_failures	wIOf	Metric	Count	Yes	Number of **write** command failures observed external to a target external to a switch port.
read_io_scsi_check_condition_count	rIOSchcoct	Metric	Count	No	Number of **read** command check conditions seen external to a target external to a switch port.
write_io_scsi_check_condition_count	wIOSchcoct	Metric	Count	No	Number of **write** command check conditions seen external to a target external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
read_io_scsi_busy_count	rIOsbc	Metric	Count	No	Number of **read** command busy status seen external to a target external to a switch port.
write_io_scsi_busy_count	wIOsbc	Metric	Count	No	Number of **write** command busy status seen external to a target external to a switch port.
read_io_nvme_lba_out_of_range_count	rIONLbaoorct	Metric	Count	No	Number of **read** command *lba out of range* errors seen.
write_io_nvme_lba_out_of_range_count	wIONLbaoorct	Metric	Count	No	Number of **write** command *lba out of range* errors seen.
read_io_nvme_ns_not_ready_count	rIOnNsnrc	Metric	Count	No	Number of **read** command *namespace not ready* errors seen.
write_io_nvme_ns_not_ready_count	wIOnNsnrc	Metric	Count	No	Number of **write** command *namespace not ready* errors seen.
read_io_scsi_reservation_conflict_count	rIOSrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to a target external to a switch port.
read_io_nvme_reservation_conflict_count	rIONrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to a target external to a switch port.
write_io_scsi_reservation_conflict_count	wIOSrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to a target external to a switch port.
write_io_nvme_reservation_conflict_count	wIONrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to a target external to a switch port.
read_io_scsi_queue_full_count	rIOSQfct	Metric	Count	No	Number of **read** command queue full status seen external to a target external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
write_io_scsi_queue_full_count	wIOSQfct	Metric	Count	No	Number of **write** command queue full status seen external to a target external to a switch port.
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.
total_busy_period	totBsy	Metric	Count	No	The total time for which the view instances have been active.
total_write_io_first_burst_count	totWrFirBu	Metric	Count	No	Accumulated total **write** command first burst observed external to a switch port.
total_write_io_array_delay_time	totWrArrDel	Metric	Count	No	Accumulated total **write** command array delays observed external to a switch port.
total_write_io_host_delay_time	totWrHosDel	Metric	Count	No	Accumulated total **write** command host delays observed external to a switch port.
total_write_io_sequences_count	totWrSeq	Metric	Count	No	Accumulated total **write** command sequences observed external to a switch port.
write_io_host_delay_time_min	wrHosDelMn	Metric	Count	No	Minimum **write** command host delays observed external to a switch port.
write_io_host_delay_time_max	wrHosDelMx	Metric	Count	No	Maximum **write** command host delays observed external to a switch port.
write_io_array_delay_time_max	wrArrDelMx	Metric	Count	No	Maximum **write** command array delays observed external to a switch port.
multisequence_exchange_write_io_sequences_min	wrIoSeqMn	Metric	Count	No	Minimum **write** command multisequence exchange sequences observed external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
multisequence_exchange_write_io_sequences_max	wrIoSeqMx	Metric	Count	No	Maximum **write** command multisequence exchange sequences observed external to a switch port.

Initiator View Instance (scsi_initiator and nvme_initiator)

Table 5: Flow Metrics for Initiator View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
port	port	Key	Text	No	A switch port where the SAN Analytics feature is enabled.
vsan	vsan	Key	Count	No	VSAN configured on a switch port with IO since last clearing of metrics.
initiator_id	sid	Key	Text	No	Initiator Fibre Channel ID that is external to a switch port where the IO transactions are observed.
scsi_initiator_app_count	siac	Metadata	Count	No	Number of applications for which data is hosted on an initiator external to a switch port.
nvme_initiator_app_count	niac	Metadata	Count	No	Number of applications for which data is requested by the initiators external to a switch port.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with an initiator external to a switch port.
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with an initiator external to a switch port.
scsi_initiator_entity_it_flow_count	siITfc	Metadata	Count	No	Number of IT flows associated with an initiator external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
nvme_initiator_entity_it_flow_count	niITfc	Metadata	Count	No	Number of IT flows associated with an initiator external to a switch port.
scsi_initiator_entity_itl_flow_count	siITLfc	Metadata	Count	No	Number of ITL flows associated with an initiator external to a switch port.
nvme_initiator_entity_itn_flow_count	niITNfc	Metadata	Count	No	Number of ITN flows associated with an initiator external to a switch port.
total_abts_count	totAbts	Metric	Count	Yes	Number of aborts observed.
total_read_io_count	rtIO	Metric	Count	Yes	Total **read** command data observed external to an initiator external to a switch port.
total_write_io_count	wtIO	Metric	Count	Yes	Total **write** command data observed external to an initiator external to a switch port.
total_seq_read_io_count	rstIOc	Metric	Count	No	Total sequential **read** command data observed external to an initiator external to a switch port.
total_seq_write_io_count	wrstIOc	Metric	Count	No	Total sequential **write** command data observed external to an initiator external to a switch port.
total_read_io_time	rtIOt	Metric	Microseconds	No	Accumulated total **read** command completion time observed external to an initiator external to a switch port. You can use this information to compute the average read IO completion time.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_time	wtIOt	Metric	Microseconds	No	Accumulated total **write** command completion time observed external to an initiator external to a switch port. You can use this information to compute the average **write** command completion time.
total_read_io_initiation_time	rtIOint	Metric	Microseconds	No	Accumulated total **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ commands or the first txfr_rdy for WRITE commands) observed external to an initiator external to a switch port. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average read IO initiation time.
total_write_io_initiation_time	wtIOint	Metric	Microseconds	No	Accumulated total **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator external to a switch port. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average **write** command initiation time.
total_read_io_bytes	rtIOb	Metric	Bytes	Yes	Total **read** command data that is observed external to an initiator external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_bytes	wtIOb	Metric	Bytes	Yes	Total **write** command data observed external to an initiator external to a switch port.
total_read_io_inter_gap_time	rtIOigt	Metric	Microsecond	No	Accumulated total **read** command intergap time observed external to an initiator external to a switch port. You can use this information to compute the average read IO intergap time.
total_write_io_inter_gap_time	wtIOigt	Metric	Microseconds	No	Accumulated total **write** command intergap time data observed external to an initiator external to a switch port. You can use this information to compute the average **write** command intergap time.
total_time_metric_based_read_io_count	tmrtIOc	Metric	Count	No	Total completed **read** command data observed external to an initiator external to a switch port.
total_time_metric_based_write_io_count	tmwtIOc	Metric	Count	No	Total completed **write** command data observed external to an initiator external to a switch port.
total_time_metric_based_read_io_bytes	tmrtIOb	Metric	Count	No	Total completed **read** command data observed external to an initiator external to a switch port, in bytes.
total_time_metric_based_write_io_bytes	tmwtIOb	Metric	Count	No	Total completed **write** command data observed external to an initiator external to a switch port, in bytes.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_rate	rIOr	Metric	IOs per second	Yes	The rate of **read** commands observed external to an initiator external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_rate	prIOr	Metric	IOs per second	No	The peak rate of **read** commands observed external to an initiator external to a switch port.
write_io_rate	wIOr	Metric	IOs per second	Yes	The rate of **write** commands observed external to an initiator external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_rate	pwIOr	Metric	IOs per second	No	The peak rate of **write** commands observed external to an initiator external to a switch port.
read_io_bandwidth	rIObw	Metric	Bytes per second	Yes	The **read** command bandwidth observed external to an initiator external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_bandwidth	prIObw	Metric	Bytes per second	No	Peak **read** command bandwidth observed external to an initiator external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_bandwidth	wIObw	Metric	Bytes per second	Yes	The **write** command bandwidth observed external to an initiator external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_bandwidth	pwIObw	Metric	Bytes per second	No	Peak **write** command bandwidth observed external to an initiator external to a switch port.
read_io_size_min	rIOsMi	Metric	Bytes	Yes	Minimum **read** command size observed external to an initiator external to a switch port.
read_io_size_max	rIOsMa	Metric	Bytes	Yes	Maximum **read** command size observed external to an initiator external to a switch port.
write_io_size_min	wIOsMi	Metric	Bytes	Yes	Minimum **write** command size observed external to an initiator external to a switch port.
write_io_size_max	wIOsMa	Metric	Bytes	Yes	Maximum **write** command size observed external to an initiator external to a switch port.
read_io_completion_time_min	rIOctMi	Metric	Microseconds	Yes	Minimum **read** command completion time observed external to an initiator external to a switch port.
read_io_completion_time_max	rIOctMa	Metric	Microseconds	Yes	Maximum **read** command completion time observed external to an initiator external to a switch port.
write_io_completion_time_min	wIOctMi	Metric	Microseconds	Yes	Minimum **write** command completion time observed external to an initiator external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_completion_time_max	wIOctMa	Metric	Microseconds	Yes	Maximum **write** command completion time observed external to an initiator external to a switch port.
read_io_initiation_time_min	rIOitMi	Metric	Microseconds	Yes	Minimum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator external to a switch port. The initiation time is sometimes referred to as **data access latency**.
read_io_initiation_time_max	rIOitMa	Metric	Microseconds	Yes	Maximum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator external to a switch port. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_min	wIOitMi	Metric	Microseconds	Yes	Minimum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator external to a switch port. The initiation time is sometimes referred to as **data access latency**.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_initiation_time_max	wIOitMa	Metric	Microseconds	Yes	Maximum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator external to a switch port. The initiation time is sometimes referred to as **data access latency**.
read_io_inter_gap_time_min	rIOigtMi	Metric	Microsecond	Yes	Minimum **read** command intergap time observed external to an initiator external to a switch port. read_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_inter_gap_time_max	rIOigtMa	Metric	Microsecond	Yes	Maximum **read** command intergap time observed external to an initiator external to a switch port. read_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_min	wIOigtMi	Metric	Microseconds	Yes	Minimum **write** command intergap time observed external to an initiator external to a switch port. write_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_inter_gap_time_max	wIOigtMa	Metric	Microseconds	Yes	Maximum **write** command intergap time observed external to an initiator external to a switch port. write_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_aborts	rIOa	Metric	Count	Yes	Number of **read** command aborts observed external to an initiator external to a switch port.
write_io_aborts	wIOa	Metric	Count	Yes	Number of **write** command aborts observed external to an initiator external to a switch port.
read_io_failures	rIOf	Metric	Count	Yes	Number of **read** command failures observed external to an initiator external to a switch port.
write_io_failures	wIOf	Metric	Count	Yes	Number of **write** command failures observed external to an initiator external to a switch port.
read_io_scsi_check_condition_count	rIOSchcoct	Metric	Count	No	Number of **read** command check conditions seen external to an initiator external to a switch port.
write_io_scsi_check_condition_count	wIOSchcoct	Metric	Count	No	Number of **write** command check conditions seen external to an initiator external to a switch port.
read_io_scsi_busy_count	rIOsbc	Metric	Count	No	Number of **read** command busy status seen external to an initiator external to a switch port.
write_io_scsi_busy_count	wIOsbc	Metric	Count	No	Number of **write** command busy status seen external to an initiator external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
read_io_nvme_lba_out_of_range_count	rIONLbaoorct	Metric	Count	No	Number of **read** command *lba out of range* errors seen.
write_io_nvme_lba_out_of_range_count	wIONLbaoorct	Metric	Count	No	Number of **write** command *lba out of range* errors seen.
read_io_nvme_ns_not_ready_count	rIOnNsnrc	Metric	Count	No	Number of **read** command *namespace not ready* errors seen.
write_io_nvme_ns_not_ready_count	wIOnNsnrc	Metric	Count	No	Number of **write** command *namespace not ready* errors seen.
read_io_scsi_reservation_conflict_count	rIOSrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to an initiator external to a switch port.
read_io_nvme_reservation_conflict_count	rIONrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to an initiator external to a switch port.
write_io_scsi_reservation_conflict_count	wIOSrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to an initiator external to a switch port.
write_io_nvme_reservation_conflict_count	wIONrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to an initiator external to a switch port.
read_io_scsi_queue_full_count	rIOSQfct	Metric	Count	No	Number of **read** command queue full status seen external to an initiator external to a switch port.
write_io_scsi_queue_full_count	wIOSQfct	Metric	Count	No	Number of **write** command queue full status seen external to an initiator external to a switch port.
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_busy_period	totBsy	Metric	Count	No	The total time for which the view instances have been active.
total_write_io_first_burst_count	totWrFirBu	Metric	Count	No	Accumulated total **write** command first burst observed external to a switch port.
total_write_io_array_delay_time	totWrArrDel	Metric	Count	No	Accumulated total **write** command array delays observed external to a switch port.
total_write_io_host_delay_time	totWrHosDel	Metric	Count	No	Accumulated total **write** command host delays observed external to a switch port.
total_write_io_sequences_count	totWrSeq	Metric	Count	No	Accumulated total **write** command sequences observed external to a switch port.
write_io_host_delay_time_min	wrHosDelMn	Metric	Count	No	Minimum **write** command host delays observed external to a switch port.
write_io_host_delay_time_max	wrHosDelMx	Metric	Count	No	Maximum **write** command host delays observed external to a switch port.
write_io_array_delay_time_max	wrArrDelMx	Metric	Count	No	Maximum **write** command array delays observed external to a switch port.
multisequence_exchange_write_io_sequences_min	wrIoSeqMn	Metric	Count	No	Minimum **write** command multisequence exchange sequences observed external to a switch port.
multisequence_exchange_write_io_sequences_max	wrIoSeqMx	Metric	Count	No	Maximum **write** command multisequence exchange sequences observed external to a switch port.

Target Application View Instance (scsi_target_app and nvme_target_app)

Table 6: Flow Metrics for Target Application View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
port	port	Key	text	No	A switch port where the SAN Analytics feature is enabled.
vsan	vsan	Key	Count	No	VSAN configured on a switch port with IO since last clearing of metrics.
app_id	app_id	Key	Count	No	Application identifier for an application external to a switch port.
target_id	did	Key	text	No	Target Fibre Channel ID that is external to a switch port with IO since last clearing of metrics.
scsi_target_entity_itl_flow_count	stITLfc	Metadata	Count	No	Number of ITL flows associated with an application for which data is hosted on a target external to a switch port.
nvme_target_entity_itn_flow_count	ntITNfc	Metadata	Count	No	Number of ITN flows associated with an application for which data is hosted on a target external to a switch port.
scsi_target_lun_count	stLc	Metadata	Count	No	Number of LUNs seen external to an application on a target external to a switch port.
nvme_target_namespace_count	ntNc	Metadata	Count	No	Number of namespace IDs seen external to an application on a target external to a switch port.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with an application external to a target external to a switch port.
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with an application external to a target external to a switch port.
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.

Initiator Application View Instance (scsi_initiator_app and nvme_initiator_app)

Table 7: Flow Metrics for Initiator Application View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
port	port	Key	text	No	A switch port where the SAN Analytics feature is enabled.
vsan	vsan	Key	Count	No	VSAN configured on a switch port with IO since last clearing of metrics.
app_id	app_id	Key	Count	No	Application identifier for an application external to a switch port.
initiator_id	sid	Key	text	No	Initiator Fibre Channel ID external to a switch port where the IO transactions are observed.
scsi_initiator_entity_itl_flow_count	siITLfc	Metadata	Count	No	Number of ITL flows associated with an application for which data is accessed by an initiator external to a switch port.
nvme_initiator_entity_itn_flow_count	niITNfc	Metadata	Count	No	Number of ITN flows associated with an application for which data is accessed by an initiator external to a switch port.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with an application for which the data is accessed by an initiator external to a switch port.
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with an application for which the data is accessed by an initiator external to a switch port.
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.

Target IT Flow View Instance (scsi_target_it_flow and nvme_target_it_flow)

Table 8: Flow Metrics for Target IT Flow View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
port	port	Key	text	No	A switch port where the SAN Analytics feature is enabled.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
vsan	vsan	Key	Count	No	VSAN configured on a switch port with IO since last clearing of metrics.
target_id	did	Key	Text	No	Target Fibre Channel ID external to a switch port with IO since last clearing of metrics.
initiator_id	sid	Key	text	No	Initiator Fibre Channel ID where the IO transactions are being performed on a target external to a switch port.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with a target-IT-flow record.
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with a target-IT-flow record.
scsi_target_entity_itl_flow_count	stITLfc	Metadata	Count	No	Number of ITL flows associated with a target-IT-flow record.
nvme_target_entity_itn_flow_count	ntITNfc	Metadata	Count	No	Number of ITN flows associated with a target-IT-flow record.
total_abts_count	totAbts	Metric	Count	Yes	Number of aborts observed.
total_read_io_count	rtIO	Metric	Count	Yes	Total **read** command data observed external to a target-IT-flow record.
total_write_io_count	wtIO	Metric	Count	Yes	Total **write** command data observed external to a target-IT-flow record.
total_seq_read_io_count	rstIOc	Metric	Count	No	Total sequential **read** command data observed external to a target-IT-flow record.
total_seq_write_io_count	wrstIOc	Metric	Count	No	Total sequential **write** command data observed external to a target-IT-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
total_read_io_time	rtIOt	Metric	Microseconds	No	Accumulated total **read** command completion time observed external to a target-IT-flow record. You can use this information to compute the average read IO completion time.
total_write_io_time	wtIOt	Metric	Microseconds	No	Accumulated total **write** command completion time observed external to a target-IT-flow record. You can use this information to compute the average **write** command completion time.
total_read_io_initiation_time	rtIOint	Metric	Microseconds	No	Accumulated total **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ commands or the first txfr_rdy for WRITE commands) observed external to a target-IT-flow record. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average read IO initiation time.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
total_write_io_initiation_time	wtIOint	Metric	Microseconds	No	Accumulated total **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-IT-flow record. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average **write** command initiation time.
total_read_io_bytes	rtIOb	Metric	Bytes	Yes	Total **read** command data that is observed external to a target-IT-flow record.
total_write_io_bytes	wtIOb	Metric	Bytes	Yes	Total **write** command data observed external to a target-IT-flow record.
total_read_io_inter_gap_time	rtIOigt	Metric	Microsecond	No	Accumulated total **read** command intergap time observed external to a target-IT-flow record. You can use this information to compute the average read IO intergap time.
total_write_io_inter_gap_time	wtIOigt	Metric	Microseconds	No	Accumulated total **write** command intergap time data observed external to a target-IT-flow record. You can use this information to compute the average **write** command intergap time.
total_time_metric_based_read_io_count	tmrtIOc	Metric	Count	No	Total completed **read** command data observed external to a target-IT-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_time_metric_based_write_io_count	tmwtIOc	Metric	Count	No	Total completed **write** command data observed external to a target-IT-flow record.
total_time_metric_based_read_io_bytes	tmrtIOb	Metric	Count	No	Total completed **read** command data observed external to a target-IT-flow record, in bytes.
total_time_metric_based_write_io_bytes	tmwtIOb	Metric	Count	No	Total completed **write** command data observed external to a target-IT-flow record, in bytes.
read_io_rate	rIOr	Metric	IOs per second	Yes	The rate of **read** commands observed external to a target-IT-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_rate	prIOr	Metric	IOs per second	No	The peak rate of **read** commands observed external to a target-IT-flow record.
write_io_rate	wIOr	Metric	IOs per second	Yes	The rate of **write** commands observed external to a target-IT-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_rate	pwIOr	Metric	IOs per second	No	The rate of peak **write** commands observed external to a target-IT-flow record.
read_io_bandwidth	rIObw	Metric	Bytes per second	Yes	The **read** command bandwidth observed external to a target-IT-flow record. This metric is the average value collected over a 4-second interval from the NPU.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
peak_read_io_bandwidth	prIObw	Metric	Bytes per second	No	Peak **read** command bandwidth observed external to a target-IT-flow record.
write_io_bandwidth	wIObw	Metric	Bytes per second	Yes	The **write** command bandwidth observed external to a target-IT-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_bandwidth	pwIObw	Metric	Bytes per second	No	Peak **write** command bandwidth observed external to a target-IT-flow record.
read_io_size_min	rIOsMi	Metric	Bytes	Yes	Minimum **read** command size observed external to a target-IT-flow record.
read_io_size_max	rIOsMa	Metric	Bytes	Yes	Maximum **read** command size observed external to a target-IT-flow record.
write_io_size_min	wIOsMi	Metric	Bytes	Yes	Minimum **write** command size observed external to a target-IT-flow record.
write_io_size_max	wIOsMa	Metric	Bytes	Yes	Maximum **write** command size observed external to a target-IT-flow record.
read_io_completion_time_min	rIOctMi	Metric	Microseconds	Yes	Minimum **read** command completion time observed external to a target-IT-flow record.
read_io_completion_time_max	rIOctMa	Metric	Microseconds	Yes	Maximum **read** command completion time observed external to a target-IT-flow record.
write_io_completion_time_min	wIOctMi	Metric	Microseconds	Yes	Minimum **write** command completion time observed external to a target-IT-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_completion_time_max	wIOctMa	Metric	Microseconds	Yes	Maximum **write** command completion time observed external to a target-IT-flow record.
read_io_initiation_time_min	rIOitMi	Metric	Microseconds	Yes	Minimum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-IT-flow record. The initiation time is sometimes referred to as **data access latency**.
read_io_initiation_time_max	rIOitMa	Metric	Microseconds	Yes	Maximum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-IT-flow record. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_min	wIOitMi	Metric	Microseconds	Yes	Minimum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-IT-flow record. The initiation time is sometimes referred to as **data access latency**.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_initiation_time_max	wIOitMa	Metric	Microseconds	Yes	Maximum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-IT-flow record. The initiation time is sometimes referred to as **data access latency**.
read_io_inter_gap_time_min	rIOigtMi	Metric	Microsecond	Yes	Minimum **read** command intergap time observed external to a target-IT-flow record. read_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_inter_gap_time_max	rIOigtMa	Metric	Microsecond	Yes	Maximum **read** command intergap time observed external to a target-IT-flow record. read_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_min	wIOigtMi	Metric	Microseconds	Yes	Minimum **write** command intergap time observed external to a target-IT-flow record. write_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_inter_gap_time_max	wIOigtMa	Metric	Microseconds	Yes	Maximum **write** command intergap time observed external to a target-IT-flow record. write_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_aborts	rIOa	Metric	Count	Yes	Number of **read** command aborts observed external to a target-IT-flow record.
write_io_aborts	wIOa	Metric	Count	Yes	Number of **write** command aborts observed external to a target-IT-flow record.
read_io_failures	rIOf	Metric	Count	Yes	Number of **read** command failures observed external to a target-IT-flow record.
write_io_failures	wIOf	Metric	Count	Yes	Number of **write** command failures observed external to a target-IT-flow record.
read_io_scsi_check_condition_count	rIOSchcoct	Metric	Count	No	Number of **read** command check conditions seen external to a target-IT-flow record.
write_io_scsi_check_condition_count	wIOSchcoct	Metric	Count	No	Number of **write** command check conditions seen external to a target-IT-flow record.
read_io_scsi_busy_count	rIOsbc	Metric	Count	No	Number of **read** command busy status seen external to a target-IT-flow record.
write_io_scsi_busy_count	wIOsbc	Metric	Count	No	Number of **write** command busy status seen external to a target-IT-flow record.
read_io_nvme_lba_out_of_range_count	rIONLbaoorct	Metric	Count	No	Number of **read** command *lba out of range* errors seen.
write_io_nvme_lba_out_of_range_count	wIONLbaoorct	Metric	Count	No	Number of **write** command *lba out of range* errors seen.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
read_io_nvme_ns_not_ready_count	rIOnNsnrc	Metric	Count	No	Number of **read** command *namespace not ready* errors seen.
write_io_nvme_ns_not_ready_count	wIOnNsnrc	Metric	Count	No	Number of **write** command *namespace not ready* errors seen.
read_io_scsi_reservation_conflict_count	rIOSrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to a target-IT-flow record.
read_io_nvme_reservation_conflict_count	rIONrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to a target-IT-flow record.
write_io_scsi_reservation_conflict_count	wIOSrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to a target-IT-flow record.
write_io_nvme_reservation_conflict_count	wIONrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to a target-IT-flow record.
read_io_scsi_queue_full_count	rIOSQfct	Metric	Count	No	Number of **read** command queue full status seen external to a target-IT-flow record.
write_io_scsi_queue_full_count	wIOSQfct	Metric	Count	No	Number of **write** command queue full status seen external to a target-IT-flow record.
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.
total_busy_period	totBsy	Metric	Count	No	The total time for which the view instances have been active.
total_write_io_first_burst_count	totWrFirBu	Metric	Count	No	Accumulated total **write** command first burst observed external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_array_delay_time	totWrArrDel	Metric	Count	No	Accumulated total **write** command array delays observed external to a switch port.
total_write_io_host_delay_time	totWrHosDel	Metric	Count	No	Accumulated total **write** command host delays observed external to a switch port.
total_write_io_sequences_count	totWrSeq	Metric	Count	No	Accumulated total **write** command sequences observed external to a switch port.
write_io_host_delay_time_min	wrHosDelMn	Metric	Count	No	Minimum **write** command host delays observed external to a switch port.
write_io_host_delay_time_max	wrHosDelMx	Metric	Count	No	Maximum **write** command host delays observed external to a switch port.
write_io_array_delay_time_max	wrArrDelMx	Metric	Count	No	Maximum **write** command array delays observed external to a switch port.
multisequence_exchange_write_io_sequences_min	wrIoSeqMn	Metric	Count	No	Minimum **write** command multisequence exchange sequences observed external to a switch port.
multisequence_exchange_write_io_sequences_max	wrIoSeqMx	Metric	Count	No	Maximum **write** command multisequence exchange sequences observed external to a switch port.

Initiator IT Flow View Instance (scsi_initiator_it_flow and nvme_initiator_it_flow)

Table 9: Flow Metrics for Initiator IT Flow View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
port	port	Key	Text	No	A switch port where the SAN Analytics feature is enabled.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
vsan	vsan	Key	Count	No	VSAN configured on a switch port with IO since last clearing of metrics.
initiator_id	sid	Key	Text	No	Initiator Fibre Channel ID external to a switch port where the IO transactions are observed.
target_id	did	Key	Text	No	Target Fibre Channel ID that is executing IO transactions initiated by an initiator external to a switch port.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with an initiator-IT-flow record.
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with an initiator-IT-flow record.
scsi_initiator_entity_itl_flow_count	siITLfc	Metadata	Count	No	Number of ITL-flows associated with an initiator-IT-flow record.
nvme_initiator_entity_itn_flow_count	niITNfc	Metadata	Count	No	Number of ITN-flows associated with an initiator-IT-flow record.
total_abts_count	totAbts	Metric	Count	Yes	Number of aborts observed.
total_read_io_count	rtIO	Metric	Count	Yes	Total **read** command data observed external to an initiator-IT-flow record.
total_write_io_count	wtIO	Metric	Count	Yes	Total **write** command data observed external to an initiator-IT-flow record.
total_seq_read_io_count	rstIOc	Metric	Count	No	Total sequential **read** command data observed external to an initiator-IT-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
total_read_io_time	rtIOt	Metric	Microseconds	No	Accumulated total **read** command completion time observed external to an initiator-IT-flow record. You can use this information to compute the average read IO completion time.
total_seq_write_io_count	wrstIOc	Metric	Count	No	Total sequential **write** command data observed external to an initiator-IT-flow record.
total_write_io_time	wtIOt	Metric	Microseconds	No	Accumulated total **write** command completion time observed external to an initiator-IT-flow record. You can use this information to compute the average **write** command completion time.
total_read_io_initiation_time	rtIOint	Metric	Microseconds	No	Accumulated total **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ commands or the first txfr_rdy for WRITE commands) observed external to an initiator-IT-flow record. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average read IO initiation time.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
total_write_io_initiation_time	wtIOint	Metric	Microseconds	No	Accumulated total **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-IT-flow record. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average **write** command initiation time.
total_read_io_bytes	rtIOb	Metric	Bytes	Yes	Total **read** command data that is observed external to an initiator-IT-flow record.
total_write_io_bytes	wtIOb	Metric	Bytes	Yes	Total **write** command data observed external to an initiator-IT-flow record.
total_read_io_inter_gap_time	rtIOigt	Metric	Microsecond	No	Accumulated total **read** command intergap time observed external to an initiator-IT-flow record. You can use this information to compute the average read IO intergap time.
total_write_io_inter_gap_time	wtIOigt	Metric	Microseconds	No	Accumulated total **write** command intergap time data observed external to an initiator-IT-flow record. You can use this information to compute the average **write** command intergap time.
total_time_metric_based_read_io_count	tmrtIOc	Metric	Count	No	Total completed **read** command data observed external to an initiator-IT-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_time_metric_based_write_io_count	tmwtIOc	Metric	Count	No	Total completed **write** command data observed external to an initiator-IT-flow record.
total_time_metric_based_read_io_bytes	tmrtIOb	Metric	Count	No	Total completed **read** command data observed external to an initiator-IT-flow record, in bytes.
total_time_metric_based_write_io_bytes	tmwtIOb	Metric	Count	No	Total completed **write** command data observed external to an initiator-IT-flow record, in bytes.
read_io_rate	rIOr	Metric	IOs per second	Yes	The rate of **read** commands observed external to an initiator-IT-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_rate	prIOr	Metric	IOs per second	No	The peak rate of **read** commands observed external to an initiator-IT-flow record.
write_io_rate	wIOr	Metric	IOs per second	Yes	The rate of **write** commands observed external to an initiator-IT-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_rate	pwIOr	Metric	IOs per second	No	The peak rate of **write** commands observed external to an initiator-IT-flow record.
read_io_bandwidth	rIObw	Metric	Bytes per second	Yes	The **read** command bandwidth observed external to an initiator-IT-flow record. This metric is the average value collected over a 4-second interval from the NPU.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
peak_read_io_bandwidth	prIObw	Metric	Bytes per second	No	Peak **read** command bandwidth observed external to an initiator-IT-flow record.
write_io_bandwidth	wIObw	Metric	Bytes per second	Yes	The **write** command bandwidth observed external to an initiator-IT-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_bandwidth	pwIObw	Metric	Bytes per second	No	Peak **write** command bandwidth observed external to an initiator-IT-flow record.
read_io_size_min	rIOsMi	Metric	Bytes	Yes	Minimum **read** command size observed external to an initiator-IT-flow record.
read_io_size_max	rIOsMa	Metric	Bytes	Yes	Maximum **read** command size observed external to an initiator-IT-flow record.
write_io_size_min	wIOsMi	Metric	Bytes	Yes	Minimum **write** command size observed external to an initiator-IT-flow record.
write_io_size_max	wIOsMa	Metric	Bytes	Yes	Maximum **write** command size observed external to an initiator-IT-flow record.
read_io_completion_time_min	rIOctMi	Metric	Microseconds	Yes	Minimum **read** command completion time observed external to an initiator-IT-flow record.
read_io_completion_time_max	rIOctMa	Metric	Microseconds	Yes	Maximum **read** command completion time observed external to an initiator-IT-flow record.
write_io_completion_time_min	wIOctMi	Metric	Microseconds	Yes	Minimum **write** command completion time observed external to an initiator-IT-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_completion_time_max	wIOctMa	Metric	Microseconds	Yes	Maximum **write** command completion time observed external to an initiator-IT-flow record.
read_io_initiation_time_min	rIOitMi	Metric	Microseconds	Yes	Minimum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-IT-flow record. The initiation time is sometimes referred to as **data access latency**.
read_io_initiation_time_max	rIOitMa	Metric	Microseconds	Yes	Maximum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-IT-flow record. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_min	wIOitMi	Metric	Microseconds	Yes	Minimum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-IT-flow record. The initiation time is sometimes referred to as **data access latency**.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_initiation_time_max	wIOitMa	Metric	Microseconds	Yes	Maximum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-IT-flow record. The initiation time is sometimes referred to as **data access latency**.
read_io_inter_gap_time_min	rIOigtMi	Metric	Microsecond	Yes	Minimum **read** command intergap time observed external to an initiator-IT-flow record. read_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_inter_gap_time_max	rIOigtMa	Metric	Microsecond	Yes	Maximum **read** command intergap time observed external to an initiator-IT-flow record. read_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_min	wIOigtMi	Metric	Microseconds	Yes	Minimum **write** command intergap time observed external to an initiator-IT-flow record. write_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_inter_gap_time_max	wIOigtMa	Metric	Microseconds	Yes	Maximum **write** command intergap time observed external to an initiator-IT-flow record. write_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_aborts	rIOa	Metric	Count	Yes	Number of **read** command aborts observed external to an initiator-IT-flow record.
write_io_aborts	wIOa	Metric	Count	Yes	Number of **write** command aborts observed external to an initiator-IT-flow record.
read_io_failures	rIOf	Metric	Count	Yes	Number of **read** command failures observed external to an initiator-IT-flow record.
write_io_failures	wIOf	Metric	Count	Yes	Number of **write** command failures observed external to an initiator-IT-flow record.
read_io_scsi_check_condition_count	rIOSchcoct	Metric	Count	No	Number of **read** command check conditions seen external to an initiator-IT-flow record.
write_io_scsi_check_condition_count	wIOSchcoct	Metric	Count	No	Number of **write** command check conditions seen external to an initiator-IT-flow record.
read_io_scsi_busy_count	rIOsbc	Metric	Count	No	Number of **read** command busy status seen external to an initiator-IT-flow record.
write_io_scsi_busy_count	wIOsbc	Metric	Count	No	Number of **write** command busy status seen external to an initiator-IT-flow record.
read_io_nvme_lba_out_of_range_count	rIONLbaoorct	Metric	Count	No	Number of **read** command *lba out of range* errors seen.
write_io_nvme_lba_out_of_range_count	wIONLbaoorct	Metric	Count	No	Number of **write** command *lba out of range* errors seen.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
read_io_nvme_ns_not_ready_count	rIOnNsnrc	Metric	Count	No	Number of **read** command *namespace not ready* errors seen.
write_io_nvme_ns_not_ready_count	wIOnNsnrc	Metric	Count	No	Number of **write** command *namespace not ready* errors seen.
read_io_scsi_reservation_conflict_count	rIOSrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to an initiator-IT-flow record.
read_io_nvme_reservation_conflict_count	rIONrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to an initiator-IT-flow record.
write_io_scsi_reservation_conflict_count	wIOSrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to an initiator-IT-flow record.
write_io_nvme_reservation_conflict_count	wIONrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to an initiator-IT-flow record.
read_io_scsi_queue_full_count	rIOSQfct	Metric	Count	No	Number of **read** command queue full status seen external to an initiator-IT-flow record.
write_io_scsi_queue_full_count	wIOSQfct	Metric	Count	No	Number of **write** command queue full status seen external to an initiator-IT-flow record.
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.
total_busy_period	totBsy	Metric	Count	No	The total time for which the view instances have been active.
total_write_io_first_burst_count	totWrFirBu	Metric	Count	No	Accumulated total **write** command first burst observed external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_array_delay_time	totWrArrDel	Metric	Count	No	Accumulated total **write** command array delays observed external to a switch port.
total_write_io_host_delay_time	totWrHosDel	Metric	Count	No	Accumulated total **write** command host delays observed external to a switch port.
total_write_io_sequences_count	totWrSeq	Metric	Count	No	Accumulated total **write** command sequences observed external to a switch port.
write_io_host_delay_time_min	wrHosDelMn	Metric	Count	No	Minimum **write** command host delays observed external to a switch port.
write_io_host_delay_time_max	wrHosDelMx	Metric	Count	No	Maximum **write** command host delays observed external to a switch port.
write_io_array_delay_time_max	wrArrDelMx	Metric	Count	No	Maximum **write** command array delays observed external to a switch port.
multisequence_exchange_write_io_sequences_min	wrIoSeqMn	Metric	Count	No	Minimum **write** command multisequence exchange sequences observed external to a switch port.
multisequence_exchange_write_io_sequences_max	wrIoSeqMx	Metric	Count	No	Maximum **write** command multisequence exchange sequences observed external to a switch port.

Target TL Flow View Instance (scsi_target_tl_flow)

Note The flow metrics for *Target TL Flow View Instance* are applicable only for the SCSI analytics type.

Table 10: Flow Metrics for Target TL Flow View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
port	port	Key	Text	No	A switch port where the SAN Analytics feature is enabled.
vsan	vsan	Key	Count	No	VSAN configured on a switch port with IO since last clearing of metrics.
target_id	did	Key	Text	No	Target Fibre Channel ID that is external to a switch port with IO since last clearing of metrics.
lun	lun	Key	Unit	No	Logical-unit-number (LUN) that is associated with a target where IOs are performed.
scsi_target_entity_itl_flow_count	stITLfc	Metadata	Count	No	Number of ITL flows associated with a LUN on a target external to a switch port.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with a LUN on a target external to a switch port.
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with a LUN on a target external to a switch port.
total_read_io_count	rtIO	Metric	Count	Yes	Total **read** command data observed external to a LUN on a target external to a switch port.
total_write_io_count	wtIO	Metric	Count	Yes	Total **write** command data observed external to a LUN on a target external to a switch port.
total_seq_read_io_count	rstIOc	Metric	Count	No	Total sequential **read** command data observed external to a LUN on a target external to a switch port.
total_seq_write_io_count	wrstIOc	Metric	Count	No	Total sequential **write** command data observed external to a LUN on a target external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_read_io_time	rtIOt	Metric	Microseconds	No	Accumulated total **read** command completion time observed external to a LUN on a target external to a switch port. You can use this information to compute the average read IO completion time.
total_write_io_time	wtIOt	Metric	Microseconds	No	Accumulated total **write** command completion time observed external to a LUN on a target external to a switch port. You can use this information to compute the average **write** command completion time.
total_read_io_initiation_time	rtIOint	Metric	Microseconds	No	Accumulated total **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ commands or the first txfr_rdy for WRITE commands) observed external to a LUN on a target external to a switch port. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average read IO initiation time.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_initiation_time	wtIOint	Metric	Microseconds	No	Accumulated total **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a LUN on a target external to a switch port. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average **write** command initiation time.
total_read_io_bytes	rtIOb	Metric	Bytes	Yes	Total **read** command data that is observed external to a LUN on a target external to a switch port.
total_write_io_bytes	wtIOb	Metric	Bytes	Yes	Total **write** command data observed external to a LUN on a target external to a switch port.
total_read_io_inter_gap_time	rtIOigt	Metric	Microsecond	No	Accumulated total **read** command intergap time observed external to a LUN on a target external to a switch port. You can use this information to compute the average read IO intergap time.
total_write_io_inter_gap_time	wtIOigt	Metric	Microseconds	No	Accumulated total **write** command intergap time data observed external to a LUN on a target external to a switch port. You can use this information to compute the average **write** command intergap time.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_time_metric_based_read_io_count	tmrtIOc	Metric	Count	No	Total completed **read** command data observed external to a LUN on a target external to a switch port.
total_time_metric_based_write_io_count	tmwtIOc	Metric	Count	No	Total completed **write** command data observed external to a LUN on a target external to a switch port.
total_time_metric_based_read_io_bytes	tmrtIOb	Metric	Count	No	Total completed **read** command data observed external to a LUN on a target external to a switch port, in bytes.
total_time_metric_based_write_io_bytes	tmwtIOb	Metric	Count	No	Total completed **write** command data observed external to a LUN on a target external to a switch port, in bytes.
read_io_rate	rIOr	Metric	IOs per second	Yes	The rate of **read** command observed external to a LUN on a target external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_rate	prIOr	Metric	IOs per second	No	The peak rate of **read** commands observed external to a LUN on a target external to a switch port.
write_io_rate	wIOr	Metric	IOs per second	Yes	The rate of **write** commands observed external to a LUN on a target external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_rate	pwIOr	Metric	IOs per second	No	The peak rate of **write** commands observed external to a LUN on a target external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_bandwidth	rIObw	Metric	Bytes per second	Yes	The **read** command bandwidth observed external to a LUN on a target external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_bandwidth	prIObw	Metric	Bytes per second	No	Peak **read** command bandwidth observed external to a LUN on a target external to a switch port.
write_io_bandwidth	wIObw	Metric	Bytes per second	Yes	The **write** command bandwidth observed external to a LUN on a target external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_bandwidth	pwIObw	Metric	Bytes per second	No	Peak **write** command bandwidth observed external to a LUN on a target external to a switch port.
read_io_size_min	rIOsMi	Metric	Bytes	Yes	Minimum **read** command size observed external to a LUN on a target external to a switch port.
read_io_size_max	rIOsMa	Metric	Bytes	Yes	Maximum **read** command size observed external to a LUN on a target external to a switch port.
write_io_size_min	wIOsMi	Metric	Bytes	Yes	Minimum **write** command size observed external to a LUN on a target external to a switch port.
write_io_size_max	wIOsMa	Metric	Bytes	Yes	Maximum **write** command size observed external to a LUN on a target external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_completion_time_min	rIOctMi	Metric	Microseconds	Yes	Minimum **read** command completion time observed external to a LUN on a target external to a switch port.
read_io_completion_time_max	rIOctMa	Metric	Microseconds	Yes	Maximum **read** command completion time observed external to a LUN on a target external to a switch port.
write_io_completion_time_min	wIOctMi	Metric	Microseconds	Yes	Minimum **write** command completion time observed external to a LUN on a target external to a switch port.
write_io_completion_time_max	wIOctMa	Metric	Microseconds	Yes	Maximum **write** command completion time observed external to a LUN on a target external to a switch port.
read_io_initiation_time_min	rIOitMi	Metric	Microseconds	Yes	Minimum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a LUN on a target external to a switch port. The initiation time is sometimes referred to as **data access latency**.
read_io_initiation_time_max	rIOitMa	Metric	Microseconds	Yes	Maximum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a LUN on a target external to a switch port. The initiation time is sometimes referred to as **data access latency**.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_initiation_time_min	wIOitMi	Metric	Microseconds	Yes	Minimum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a LUN on a target external to a switch port. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_max	wIOitMa	Metric	Microseconds	Yes	Maximum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a LUN on a target external to a switch port. The initiation time is sometimes referred to as **data access latency**.
read_io_inter_gap_time_min	rIOigtMi	Metric	Microsecond	Yes	Minimum **read** command intergap time observed external to a LUN on a target external to a switch port. read_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_inter_gap_time_max	rIOigtMa	Metric	Microsecond	Yes	Maximum **read** command intergap time observed external to a LUN on a target external to a switch port. read_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_inter_gap_time_min	wIOigtMi	Metric	Microseconds	Yes	Minimum **write** command intergap time observed external to a LUN on a target external to a switch port. write_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_max	wIOigtMa	Metric	Microseconds	Yes	Maximum **write** command intergap time observed external to a LUN on a target external to a switch port. write_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_aborts	rIOa	Metric	Count	Yes	Number of **read** command aborts observed external to a LUN on a target external to a switch port.
write_io_aborts	wIOa	Metric	Count	Yes	Number of **write** command aborts observed external to a LUN on a target external to a switch port.
read_io_failures	rIOf	Metric	Count	Yes	Number of **read** command failures observed external to a LUN on a target external to a switch port.
write_io_failures	wIOf	Metric	Count	Yes	Number of **write** command failures observed external to a LUN on a target external to a switch port.
read_io_scsi_check_condition_count	rIOSchcoct	Metric	Count	No	Number of **read** command check conditions seen external to a LUN on a target external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_scsi_check_condition_count	wIOSchcoct	Metric	Count	No	Number of **write** command check conditions seen external to a LUN on a target external to a switch port.
read_io_scsi_busy_count	rIOsbc	Metric	Count	No	Number of **read** command busy status seen external to a LUN on a target external to a switch port.
write_io_scsi_busy_count	wIOsbc	Metric	Count	No	Number of **write** command busy status seen external to a LUN on a target external to a switch port.
read_io_scsi_reservation_conflict_count	rIOSrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to a LUN on a target external to a switch port.
write_io_scsi_reservation_conflict_count	wIOSrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to a LUN on a target external to a switch port.
read_io_scsi_queue_full_count	rIOSQfct	Metric	Count	No	Number of **read** command queue full status seen external to a LUN on a target external to a switch port.
write_io_scsi_queue_full_count	wIOSQfct	Metric	Count	No	Number of **write** command queue full status seen external to a LUN on a target external to a switch port.
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.
total_busy_period	totBsy	Metric	Count	No	The total time for which the view instances have been active.
total_write_io_first_burst_count	totWrFirBu	Metric	Count	No	Accumulated total **write** command first burst observed external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_array_delay_time	totWrArrDel	Metric	Count	No	Accumulated total **write** command array delays observed external to a switch port.
total_write_io_host_delay_time	totWrHosDel	Metric	Count	No	Accumulated total **write** command host delays observed external to a switch port.
total_write_io_sequences_count	totWrSeq	Metric	Count	No	Accumulated total **write** command sequences observed external to a switch port.
write_io_host_delay_time_min	wrHosDelMn	Metric	Count	No	Minimum **write** command host delays observed external to a switch port.
write_io_host_delay_time_max	wrHosDelMx	Metric	Count	No	Maximum **write** command host delays observed external to a switch port.
write_io_array_delay_time_max	wrArrDelMx	Metric	Count	No	Maximum **write** command array delays observed external to a switch port.
multisequence_exchange_write_io_sequences_min	wrIoSeqMn	Metric	Count	No	Minimum **write** command multisequence exchange sequences observed external to a switch port.
multisequence_exchange_write_io_sequences_max	wrIoSeqMx	Metric	Count	No	Maximum **write** command multisequence exchange sequences observed external to a switch port.

Target TN Flow View Instance (nvme_target_tn_flow)



Note The flow metrics for *Target TN Flow View Instance* are applicable only for the NVMe analytics type.

Table 11: Flow Metrics for Target TN Flow View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
port	port	Key	Text	No	A switch port where the SAN Analytics feature is enabled.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
vsan	vsan	Key	Count	No	VSAN configured on a switch port with IO since last clearing of metrics.
target_id	did	Key	Text	No	Target Fibre Channel ID that is external to a switch port with IO since last clearing of metrics.
connection_id	ci	Key	Count	No	The NVMe connection id that is external to a switch port with IO since last clearing of metrics.
namespace_id	ni	Key	Count	No	The namespace ID is the NVMe controller's unique identifier for the namespace and can be set to a value between 1 and 255. It is analogous to a logical unit number (LUN) in SCSI.
nvme_target_entity_itn_flow_count	ntITNfc	Metadata	Count	No	Number of ITN flows associated with a namespace ID on a target external to a switch port.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with a LUN on a target external to a switch port.
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with a LUN on a target external to a switch port.
total_read_io_count	rtIO	Metric	Count	Yes	Total **read** command data observed external to a LUN on a target external to a switch port.
total_write_io_count	wtIO	Metric	Count	Yes	Total **write** command data observed external to a LUN on a target external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_seq_read_io_count	rstIOc	Metric	Count	No	Total sequential **read** command data observed external to a LUN on a target external to a switch port.
total_seq_write_io_count	wrstIOc	Metric	Count	No	Total sequential **write** command data observed external to a LUN on a target external to a switch port.
total_read_io_time	rtIOt	Metric	Microseconds	No	Accumulated total **read** command completion time observed external to a LUN on a target external to a switch port. You can use this information to compute the average read IO completion time.
total_write_io_time	wtIOt	Metric	Microseconds	No	Accumulated total **write** command completion time observed external to a LUN on a target external to a switch port. You can use this information to compute the average **write** command completion time.
total_read_io_initiation_time	rtIOint	Metric	Microseconds	No	Accumulated total **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ commands or the first txfr_rdy for WRITE commands) observed external to a LUN on a target external to a switch port. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average read IO initiation time.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_initiation_time	wtIOint	Metric	Microseconds	No	Accumulated total **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a LUN on a target external to a switch port. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average **write** command initiation time.
total_read_io_bytes	rtIOb	Metric	Bytes	Yes	Total **read** command data that is observed external to a LUN on a target external to a switch port.
total_write_io_bytes	wtIOb	Metric	Bytes	Yes	Total **write** command data observed external to a LUN on a target external to a switch port.
total_read_io_inter_gap_time	rtIOigt	Metric	Microsecond	No	Accumulated total **read** command intergap time observed external to a LUN on a target external to a switch port. You can use this information to compute the average read IO intergap time.
total_write_io_inter_gap_time	wtIOigt	Metric	Microseconds	No	Accumulated total **write** command intergap time data observed external to a LUN on a target external to a switch port. You can use this information to compute the average **write** command intergap time.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_time_metric_based_read_io_count	tmrtIOc	Metric	Count	No	Total completed **read** command data observed external to a LUN on a target external to a switch port.
total_time_metric_based_write_io_count	tmwtIOc	Metric	Count	No	Total completed **write** command data observed external to a LUN on a target external to a switch port.
total_time_metric_based_read_io_bytes	tmrtIOb	Metric	Count	No	Total completed **read** command data observed external to a LUN on a target external to a switch port, in bytes.
total_time_metric_based_write_io_bytes	tmwtIOb	Metric	Count	No	Total completed **write** command data observed external to a LUN on a target external to a switch port, in bytes.
read_io_rate	rIOr	Metric	IOs per second	Yes	The rate of **read** commands observed external to a LUN on a target external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_rate	prIOr	Metric	IOs per second	No	The peak rate of **read** commands observed external to a LUN on a target external to a switch port.
write_io_rate	wIOr	Metric	IOs per second	Yes	The read of **write** commands observed external to a LUN on a target external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
peak_write_io_rate	pwIOr	Metric	IOs per second	No	The peak rate of **write** commands observed external to a LUN on a target external to a switch port.
read_io_bandwidth	rIObw	Metric	Bytes per second	Yes	The **read** command bandwidth observed external to a LUN on a target external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_bandwidth	prIObw	Metric	Bytes per second	No	Peak **read** command bandwidth observed external to a LUN on a target external to a switch port.
write_io_bandwidth	wIObw	Metric	Bytes per second	Yes	The **write** command bandwidth observed external to a LUN on a target external to a switch port. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_bandwidth	pwIObw	Metric	Bytes per second	No	Peak **write** command bandwidth observed external to a LUN on a target external to a switch port.
read_io_size_min	rIOsMi	Metric	Bytes	Yes	Minimum **read** command size observed external to a LUN on a target external to a switch port.
read_io_size_max	rIOsMa	Metric	Bytes	Yes	Maximum **read** command size observed external to a LUN on a target external to a switch port.
write_io_size_min	wIOsMi	Metric	Bytes	Yes	Minimum **write** command size observed external to a LUN on a target external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
write_io_size_max	wIOsMa	Metric	Bytes	Yes	Maximum **write** command size observed external to a LUN on a target external to a switch port.
read_io_completion_time_min	rIOctMi	Metric	Microseconds	Yes	Minimum **read** command completion time observed external to a LUN on a target external to a switch port.
read_io_completion_time_max	rIOctMa	Metric	Microseconds	Yes	Maximum **read** command completion time observed external to a LUN on a target external to a switch port.
write_io_completion_time_min	wIOctMi	Metric	Microseconds	Yes	Minimum **write** command completion time observed external to a LUN on a target external to a switch port.
write_io_completion_time_max	wIOctMa	Metric	Microseconds	Yes	Maximum **write** command completion time observed external to a LUN on a target external to a switch port.
read_io_initiation_time_min	rIOitMi	Metric	Microseconds	Yes	Minimum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a LUN on a target external to a switch port. The initiation time is sometimes referred to as **data access latency**.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
read_io_initiation_time_max	rIOitMa	Metric	Microseconds	Yes	Maximum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a LUN on a target external to a switch port. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_min	wIOitMi	Metric	Microseconds	Yes	Minimum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a LUN on a target external to a switch port. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_max	wIOitMa	Metric	Microseconds	Yes	Maximum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a LUN on a target external to a switch port. The initiation time is sometimes referred to as **data access latency**.
read_io_inter_gap_time_min	rIOigtMi	Metric	Microsecond	Yes	Minimum **read** command intergap time observed external to a LUN on a target external to a switch port. read_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_inter_gap_time_max	rIOigtMa	Metric	Microsecond	Yes	Maximum **read** command intergap time observed external to a LUN on a target external to a switch port. read_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_min	wIOigtMi	Metric	Microseconds	Yes	Minimum **write** command intergap time observed external to a LUN on a target external to a switch port. write_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_max	wIOigtMa	Metric	Microseconds	Yes	Maximum **write** command intergap time observed external to a LUN on a target external to a switch port. write_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_aborts	rIOa	Metric	Count	Yes	Number of **read** command aborts observed external to a LUN on a target external to a switch port.
write_io_aborts	wIOa	Metric	Count	Yes	Number of **write** command aborts observed external to a LUN on a target external to a switch port.
read_io_failures	rIOf	Metric	Count	Yes	Number of **read** command failures observed external to a LUN on a target external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
write_io_failures	wIOf	Metric	Count	Yes	Number of **write** command failures observed external to a LUN on a target external to a switch port.
read_io_nvme_lba_out_of_range_count	rIONLbaoorct	Metric	Count	No	Number of **read** command *lba out of range* errors seen.
write_io_nvme_lba_out_of_range_count	wIONLbaoorct	Metric	Count	No	Number of **write** command *lba out of range* errors seen.
read_io_nvme_ns_not_ready_count	rIOnNsnrc	Metric	Count	No	Number of **read** command *namespace not ready* errors seen.
write_io_nvme_ns_not_ready_count	wIOnNsnrc	Metric	Count	No	Number of **write** command *namespace not ready* errors seen.
read_io_nvme_reservation_conflict_count	rIONrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to a namespace ID on a target external to a switch port.
write_io_nvme_reservation_conflict_count	wIONrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to a namespace ID on a target external to a switch port.
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.
total_busy_period	totBsy	Metric	Count	No	The total time for which the view instances have been active.
total_write_io_first_burst_count	totWrFirBu	Metric	Count	No	Accumulated total **write** command first burst observed external to a switch port.
total_write_io_array_delay_time	totWrArrDel	Metric	Count	No	Accumulated total **write** command array delays observed external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_host_delay_time	totWrHosDel	Metric	Count	No	Accumulated total **write** command host delays observed external to a switch port.
total_write_io_sequences_count	totWrSeq	Metric	Count	No	Accumulated total **write** command sequences observed external to a switch port.
write_io_host_delay_time_min	wrHosDelMn	Metric	Count	No	Minimum **write** command host delays observed external to a switch port.
write_io_host_delay_time_max	wrHosDelMx	Metric	Count	No	Maximum **write** command host delays observed external to a switch port.
write_io_array_delay_time_max	wrArrDelMx	Metric	Count	No	Maximum **write** command array delays observed external to a switch port.
multisequence_exchange_write_io_sequences_min	wrIoSeqMn	Metric	Count	No	Minimum **write** command multisequence exchange sequences observed external to a switch port.
multisequence_exchange_write_io_sequences_max	wrIoSeqMx	Metric	Count	No	Maximum **write** command multisequence exchange sequences observed external to a switch port.

Initiator ITL Flow View Instance (scsi_initiator_itl_flow)

Note The flow metrics for *Initiator ITL Flow View Instance* are applicable only for the SCSI analytics type.

Table 12: Flow Metrics for Initiator ITL Flow View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
port	port	Key	Text	No	A switch port where the SAN Analytics feature is enabled.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
vsan	vsan	Key	Count	No	VSAN configured on a switch port with IO since last clearing of metrics.
app_id	app_id	Key	Count	No	Application identifier for an application external to a switch port.
initiator_id	sid	Key	Text	No	Initiator Fibre Channel ID that is external to a switch port where the IO transactions are observed.
target_id	did	Key	Text	No	Target Fibre Channel ID that is executing IO transactions initiated by an initiator external to switch port.
lun	lun	Key	Count	No	Logical-unit-number (LUN) that is associated with an initiator where IOs are performed.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with an initiator-ITL-flow record.
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with an initiator-ITL-flow record.
total_read_io_count	rtIO	Metric	Count	Yes	Total **read** command data observed external to an initiator-ITL-flow record.
total_write_io_count	wtIO	Metric	Count	Yes	Total **write** command data observed external to an initiator-ITL-flow record.
total_seq_read_io_count	rstIOc	Metric	Count	No	Total sequential **read** command data observed external to an initiator-ITL-flow record.
total_seq_write_io_count	wrstIOc	Metric	Count	No	Total sequential **write** command data observed external to an initiator-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_read_io_time	rtIOt	Metric	Microseconds	No	Accumulated total **read** command completion time observed external to an initiator-ITL-flow record. You can use this information to compute the average read IO completion time.
total_write_io_time	wtIOt	Metric	Microseconds	No	Accumulated total **write** command completion time observed external to an initiator-ITL-flow record. You can use this information to compute the average **write** command completion time.
total_read_io_initiation_time	rtIOint	Metric	Microseconds	No	Accumulated total **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ commands or the first txfr_rdy for WRITE commands) observed external to an initiator-ITL-flow record. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average read IO initiation time.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_initiation_time	wtIOint	Metric	Microseconds	No	Accumulated total **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-ITL-flow record. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average **write** command initiation time.
total_read_io_bytes	rtIOb	Metric	Bytes	Yes	Total **read** command data that is observed external to an initiator-ITL-flow record.
total_write_io_bytes	wtIOb	Metric	Bytes	Yes	Total **write** command data observed external to an initiator-ITL-flow record.
total_read_io_inter_gap_time	rtIOigt	Metric	Microsecond	No	Accumulated total **read** command intergap time observed external to an initiator-ITL-flow record. You can use this information to compute the average read IO intergap time.
total_write_io_inter_gap_time	wtIOigt	Metric	Microseconds	No	Accumulated total **write** command intergap time data observed external to an initiator-ITL-flow record. You can use this information to compute the average **write** command intergap time.
total_time_metric_based_read_io_count	tmrtIOc	Metric	Count	No	Total completed **read** command data observed external to an initiator-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_time_metric_based_write_io_count	tmwtIOc	Metric	Count	No	Total completed **write** command data observed external to an initiator-ITL-flow record.
total_time_metric_based_read_io_bytes	tmrtIOb	Metric	Count	No	Total completed **read** command data observed external to an initiator-ITL-flow record, in bytes.
total_time_metric_based_write_io_bytes	tmwtIOb	Metric	Count	No	Total completed **write** command data observed external to an initiator-ITL-flow record, in bytes.
read_io_rate	rIOr	Metric	IOs per second	Yes	The rate of **read** commands observed external to an initiator-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_rate	prIOr	Metric	IOs per second	No	The peak rate of **read** commands observed external to an initiator-ITL-flow record.
write_io_rate	wIOr	Metric	IOs per second	Yes	The rate of **write** commands observed external to an initiator-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_rate	pwIOr	Metric	IOs per second	No	The peak rate of **write** commands observed external to an initiator-ITL-flow record.
read_io_bandwidth	rIObw	Metric	Bytes per second	Yes	The **read** command bandwidth observed external to an initiator-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_bandwidth	prIObw	Metric	Bytes per second	No	Peak **read** command bandwidth observed external to an initiator-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_bandwidth	wIObw	Metric	Bytes per second	Yes	The **write** command bandwidth observed external to an initiator-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_bandwidth	pwIObw	Metric	Bytes per second	No	Peak **write** command bandwidth observed external to an initiator-ITL-flow record.
read_io_size_min	rIOsMi	Metric	Bytes	Yes	Minimum **read** command size observed external to an initiator-ITL-flow record.
read_io_size_max	rIOsMa	Metric	Bytes	Yes	Maximum **read** command size observed external to an initiator-ITL-flow record.
write_io_size_min	wIOsMi	Metric	Bytes	Yes	Minimum **write** command size observed external to an initiator-ITL-flow record.
write_io_size_max	wIOsMa	Metric	Bytes	Yes	Maximum **write** command size observed external to an initiator-ITL-flow record.
read_io_completion_time_min	rIOctMi	Metric	Microseconds	Yes	Minimum **read** command completion time observed external to an initiator-ITL-flow record.
read_io_completion_time_max	rIOctMa	Metric	Microseconds	Yes	Maximum **read** command completion time observed external to an initiator-ITL-flow record.
write_io_completion_time_min	wIOctMi	Metric	Microseconds	Yes	Minimum **write** command completion time observed external to an initiator-ITL-flow record.
write_io_completion_time_max	wIOctMa	Metric	Microseconds	Yes	Maximum **write** command completion time observed external to an initiator-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_initiation_time_min	rIOitMi	Metric	Microseconds	Yes	Minimum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.
read_io_initiation_time_max	rIOitMa	Metric	Microseconds	Yes	Maximum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_min	wIOitMi	Metric	Microseconds	Yes	Minimum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_initiation_time_max	wIOitMa	Metric	Microseconds	Yes	Maximum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.
read_io_inter_gap_time_min	rIOigtMi	Metric	Microsecond	Yes	Minimum **read** command intergap time observed external to an initiator-ITL-flow record. read_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_inter_gap_time_max	rIOigtMa	Metric	Microsecond	Yes	Maximum **read** command intergap time observed external to an initiator-ITL-flow record. read_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_min	wIOigtMi	Metric	Microseconds	Yes	Minimum **write** command intergap time observed external to an initiator-ITL-flow record. write_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_max	wIOigtMa	Metric	Microseconds	Yes	Maximum **write** command intergap time observed external to an initiator-ITL-flow record. write_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_aborts	rIOa	Metric	Count	Yes	Number of **read** command aborts observed external to an initiator-ITL-flow record.
write_io_aborts	wIOa	Metric	Count	Yes	Number of **write** command aborts observed external to an initiator-ITL-flow record.
read_io_failures	rIOf	Metric	Count	Yes	Number of **read** command failures observed external to an initiator-ITL-flow record.
write_io_failures	wIOf	Metric	Count	Yes	Number of **write** command failures observed external to an initiator-ITL-flow record.
read_io_scsi_check_condition_count	rIOSchcoct	Metric	Count	No	Number of **read** command check conditions seen external to an initiator-ITL-flow record.
write_io_scsi_check_condition_count	wIOSchcoct	Metric	Count	No	Number of **write** command check conditions seen external to an initiator-ITL-flow record.
read_io_scsi_busy_count	rIOsbc	Metric	Count	No	Number of **read** command busy status seen external to an initiator-ITL-flow record.
write_io_scsi_busy_count	wIOsbc	Metric	Count	No	Number of **write** command busy status seen external to an initiator-ITL-flow record.
read_io_scsi_reservation_conflict_count	rIOSrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to an initiator-ITL-flow record.
write_io_scsi_reservation_conflict_count	wIOSrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to an initiator-ITL-flow record.
read_io_scsi_queue_full_count	rIOSQfct	Metric	Count	No	Number of **read** command queue full status seen external to an initiator-ITL-flow record.
write_io_scsi_queue_full_count	wIOSQfct	Metric	Count	No	Number of **write** command queue full status seen external to an initiator-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.
total_busy_period	totBsy	Metric	Count	No	The total time for which the view instances have been active.
total_write_io_first_burst_count	totWrFirBu	Metric	Count	No	Accumulated total **write** command first burst observed external to a switch port.
total_write_io_array_delay_time	totWrArrDel	Metric	Count	No	Accumulated total **write** command array delays observed external to a switch port.
total_write_io_host_delay_time	totWrHosDel	Metric	Count	No	Accumulated total **write** command host delays observed external to a switch port.
total_write_io_sequences_count	totWrSeq	Metric	Count	No	Accumulated total **write** command sequences observed external to a switch port.
write_io_host_delay_time_min	wrHosDelMn	Metric	Count	No	Minimum **write** command host delays observed external to a switch port.
write_io_host_delay_time_max	wrHosDelMx	Metric	Count	No	Maximum **write** command host delays observed external to a switch port.
write_io_array_delay_time_max	wrArrDelMx	Metric	Count	No	Maximum **write** command array delays observed external to a switch port.
multisequence_exchange_write_io_sequences_min	wrIoSeqMn	Metric	Count	No	Minimum **write** command multisequence exchange sequences observed external to a switch port.
multisequence_exchange_write_io_sequences_max	wrIoSeqMx	Metric	Count	No	Maximum **write** command multisequence exchange sequences observed external to a switch port.

Initiator ITN Flow View Instance (nvme_initiator_itn_flow)



Note The flow metrics for *Initiator ITN Flow View Instance* are applicable only for the NVMe analytics type.

Table 13: Flow Metrics for Initiator ITN Flow View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
port	port	Key	Text	No	A switch port where the SAN Analytics feature is enabled.
vsan	vsan	Key	Count	No	VSAN configured on a switch port with IO since last clearing of metrics.
app_id	app_id	Key	Count	No	Application identifier for an application external to a switch port.
initiator_id	sid	Key	Text	No	Initiator Fibre Channel ID that is external to a switch port where the IO transactions are observed.
connection_id	ci	Key	Count	No	The NVMe connection id that is external to a switch port with IO since last clearing of metrics.
namespace_id	ni	Key	Count	No	The namespace ID is the NVMe controller's unique identifier for the namespace and can be set to a value between 1 and 255. It is analogous to a logical unit number (LUN) in SCSI.
target_id	did	Key	Text	No	Target Fibre Channel ID that is executing IO transactions initiated by an initiator external to a switch port.
connection_id	ci	Key	Count	No	The NVMe connection id that is external to a switch port with IO since last clearing of metrics.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
namespace_id	ni	Key	Count	No	The namespace ID is the NVMe controller's unique identifier for the namespace and can be set to a value between 1 and 255. It is analogous to a logical unit number (LUN) in SCSI.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with an initiator-ITL-flow record.
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with an initiator-ITL-flow record.
total_read_io_count	rtIO	Metric	Count	Yes	Total **read** command data observed external to an initiator-ITL-flow record.
total_write_io_count	wtIO	Metric	Count	Yes	Total **write** command data observed external to an initiator-ITL-flow record.
total_seq_read_io_count	rstIOc	Metric	Count	No	Total sequential **read** command data observed external to an initiator-ITL-flow record.
total_seq_write_io_count	wrstIOc	Metric	Count	No	Total sequential **write** command data observed external to an initiator-ITL-flow record.
total_read_io_time	rtIOt	Metric	Microseconds	No	Accumulated total **read** command completion time observed external to an initiator-ITL-flow record. You can use this information to compute the average read IO completion time.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_time	wtIOt	Metric	Microseconds	No	Accumulated total **write** command completion time observed external to an initiator-ITL-flow record. You can use this information to compute the average **write** command completion time.
total_read_io_initiation_time	rtIOint	Metric	Microseconds	No	Accumulated total **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ commands or the first txfr_rdy for WRITE commands) observed external to an initiator-ITL-flow record. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average read IO initiation time.
total_write_io_initiation_time	wtIOint	Metric	Microseconds	No	Accumulated total **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-ITL-flow record. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average **write** command initiation time.
total_read_io_bytes	rtIOb	Metric	Bytes	Yes	Total **read** command data that is observed external to an initiator-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_bytes	wtIOb	Metric	Bytes	Yes	Total **write** command data observed external to an initiator-ITL-flow record.
total_read_io_inter_gap_time	rtIOigt	Metric	Microsecond	No	Accumulated total **read** command intergap time observed external to an initiator-ITL-flow record. You can use this information to compute the average read IO intergap time.
total_write_io_inter_gap_time	wtIOigt	Metric	Microseconds	No	Accumulated total **write** command intergap time data observed external to an initiator-ITL-flow record. You can use this information to compute the average **write** command intergap time.
total_time_metric_based_read_io_count	tmrtIOc	Metric	Count	No	Total completed **read** command data observed external to an initiator-ITL-flow record.
total_time_metric_based_write_io_count	tmwtIOc	Metric	Count	No	Total completed **write** command data observed external to an initiator-ITL-flow record.
total_time_metric_based_read_io_bytes	tmrtIOb	Metric	Count	No	Total completed **read** command data observed external to an initiator-ITL-flow record, in bytes.
total_time_metric_based_write_io_bytes	tmwtIOb	Metric	Count	No	Total completed **write** command data observed external to an initiator-ITL-flow record, in bytes.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_rate	rIOr	Metric	IOs per second	Yes	The rate of **read** commands observed external to an initiator-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_rate	prIOr	Metric	IOs per second	No	The peak rate of **read** commands observed external to an initiator-ITL-flow record.
write_io_rate	wIOr	Metric	IOs per second	Yes	The rate of **write** commands observed external to an initiator-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_rate	pwIOr	Metric	IOs per second	No	The peak rate of **write** commands observed external to an initiator-ITL-flow record.
read_io_bandwidth	rIObw	Metric	Bytes per second	Yes	The **read** command bandwidth observed external to an initiator-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_bandwidth	prIObw	Metric	Bytes per second	No	Peak **read** command bandwidth observed external to an initiator-ITL-flow record.
write_io_bandwidth	wIObw	Metric	Bytes per second	Yes	The **write** command bandwidth observed external to an initiator-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
peak_write_io_bandwidth	pwIObw	Metric	Bytes per second	No	Peak **write** command bandwidth observed external to an initiator-ITL-flow record.
read_io_size_min	rIOsMi	Metric	Bytes	Yes	Minimum **read** command size observed external to an initiator-ITL-flow record.
read_io_size_max	rIOsMa	Metric	Bytes	Yes	Maximum **read** command size observed external to an initiator-ITL-flow record.
write_io_size_min	wIOsMi	Metric	Bytes	Yes	Minimum **write** command size observed external to an initiator-ITL-flow record.
write_io_size_max	wIOsMa	Metric	Bytes	Yes	Maximum **write** command size observed external to an initiator-ITL-flow record.
read_io_completion_time_min	rIOctMi	Metric	Microseconds	Yes	Minimum **read** command completion time observed external to an initiator-ITL-flow record.
read_io_completion_time_max	rIOctMa	Metric	Microseconds	Yes	Maximum **read** command completion time observed external to an initiator-ITL-flow record.
write_io_completion_time_min	wIOctMi	Metric	Microseconds	Yes	Minimum **write** command completion time observed external to an initiator-ITL-flow record.
write_io_completion_time_max	wIOctMa	Metric	Microseconds	Yes	Maximum **write** command completion time observed external to an initiator-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_initiation_time_min	rIOitMi	Metric	Microseconds	Yes	Minimum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.
read_io_initiation_time_max	rIOitMa	Metric	Microseconds	Yes	Maximum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_min	wIOitMi	Metric	Microseconds	Yes	Minimum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_initiation_time_max	wIOitMa	Metric	Microseconds	Yes	Maximum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to an initiator-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.
read_io_inter_gap_time_min	rIOigtMi	Metric	Microsecond	Yes	Minimum **read** command intergap time observed external to an initiator-ITL-flow record. read_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_inter_gap_time_max	rIOigtMa	Metric	Microsecond	Yes	Maximum **read** command intergap time observed external to an initiator-ITL-flow record. read_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_min	wIOigtMi	Metric	Microseconds	Yes	Minimum **write** command intergap time observed external to an initiator-ITL-flow record. write_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_inter_gap_time_max	wIOigtMa	Metric	Microseconds	Yes	Maximum **write** command intergap time observed external to an initiator-ITL-flow record. write_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_aborts	rIOa	Metric	Count	Yes	Number of **read** command aborts observed external to an initiator-ITL-flow record.
write_io_aborts	wIOa	Metric	Count	Yes	Number of **write** command aborts observed external to an initiator-ITL-flow record.
read_io_failures	rIOf	Metric	Count	Yes	Number of **read** command failures observed external to an initiator-ITL-flow record.
write_io_failures	wIOf	Metric	Count	Yes	Number of **write** command failures observed external to an initiator-ITL-flow record.
read_io_nvme_lba_out_of_range_count	rIONLbaoorct	Metric	Count	No	Number of **read** command *lba out of range* errors seen.
write_io_nvme_lba_out_of_range_count	wIONLbaoorct	Metric	Count	No	Number of **write** command *lba out of range* errors seen.
read_io_nvme_ns_not_ready_count	rIOnNsnrc	Metric	Count	No	Number of **read** command *namespace not ready* errors seen.
write_io_nvme_ns_not_ready_count	wIOnNsnrc	Metric	Count	No	Number of **write** command *namespace not ready* errors seen.
read_io_nvme_reservation_conflict_count	rIONrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to an initiator-ITN-flow record.
write_io_nvme_reservation_conflict_count	wIONrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to an initiator-ITN-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.
total_busy_period	totBsy	Metric	Count	No	The total time for which the view instances have been active.
total_write_io_first_burst_count	totWrFirBu	Metric	Count	No	Accumulated total **write** command first burst observed external to a switch port.
total_write_io_array_delay_time	totWrArrDel	Metric	Count	No	Accumulated total **write** command array delays observed external to a switch port.
total_write_io_host_delay_time	totWrHosDel	Metric	Count	No	Accumulated total **write** command host delays observed external to a switch port.
total_write_io_sequences_count	totWrSeq	Metric	Count	No	Accumulated total **write** command sequences observed external to a switch port.
write_io_host_delay_time_min	wrHosDelMn	Metric	Count	No	Minimum **write** command host delays observed external to a switch port.
write_io_host_delay_time_max	wrHosDelMx	Metric	Count	No	Maximum **write** command host delays observed external to a switch port.
write_io_array_delay_time_max	wrArrDelMx	Metric	Count	No	Maximum **write** command array delays observed external to a switch port.
multisequence_exchange_write_io_sequences_min	wrIoSeqMn	Metric	Count	No	Minimum **write** command multisequence exchange sequences observed external to a switch port.
multisequence_exchange_write_io_sequences_max	wrIoSeqMx	Metric	Count	No	Maximum **write** command multisequence exchange sequences observed external to a switch port.

Target ITL Flow View Instance (scsi_target_itl_flow)



Note The flow metrics for *Target ITL Flow View Instance* are applicable only for the SCSI analytics type.

Table 14: Flow Metrics for Target ITL Flow View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
port	port	Key	Text	No	A switch port where the SAN Analytics feature is enabled.
vsan	vsan	Key	Count	No	VSAN configured on a switch port with IO since last clearing of metrics.
app_id	app_id	Key	Count	No	Application identifier for an application external to a switch port.
target_id	did	Key	Text	No	Target Fibre Channel ID that is external to a switch port with IO since last clearing of metrics.
initiator_id	sid	Key	Text	No	Initiator Fibre Channel ID where the IO transactions are being performed on a target external to a switch port.
lun	lun	Key	Unit	No	Logical-unit-number (LUN) that is associated with a target where IOs are performed.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with a target-ITL-flow record.
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with a target-ITL-flow record.
total_read_io_count	rtIO	Metric	Count	Yes	Total **read** command data observed external to a target-ITL-flow record.
total_write_io_count	wtIO	Metric	Count	Yes	Total **write** command data observed external to a target-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
total_seq_read_io_count	rstIOc	Metric	Count	No	Total sequential **read** command data observed external to a target-ITL-flow record.
total_seq_write_io_count	wrstIOc	Metric	Count	No	Total sequential **write** command data observed external to a target-ITL-flow record.
total_read_io_time	rtIOt	Metric	Microseconds	No	Accumulated total **read** command completion time observed external to a target-ITL-flow record. You can use this information to compute the average read IO completion time.
total_write_io_time	wtIOt	Metric	Microseconds	No	Accumulated total **write** command completion time observed external to a target-ITL-flow record. You can use this information to compute the average **write** command completion time.
total_read_io_initiation_time	rtIOint	Metric	Microseconds	no	Accumulated total **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ commands or the first txfr_rdy for WRITE commands) observed external to a target-ITL-flow record. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average read IO initiation time.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_initiation_time	wtIOint	Metric	Microseconds	No	Accumulated total **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-ITL-flow record. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average **write** command initiation time.
total_read_io_bytes	rtIOb	Metric	Bytes	Yes	Total **read** command data that is observed external to a target-ITL-flow record.
total_write_io_bytes	wtIOb	Metric	Bytes	Yes	Total **write** command data observed external to a target-ITL-flow record.
total_read_io_inter_gap_time	rtIOigt	Metric	Microsecond	No	Accumulated total **read** command intergap time observed external to a target-ITL-flow record. You can use this information to compute the average read IO intergap time.
total_write_io_inter_gap_time	wtIOigt	Metric	Microseconds	No	Accumulated total **write** command intergap time data observed external to a target-ITL-flow record. You can use this information to compute the average **write** command intergap time.
total_time_metric_based_read_io_count	tmrtIOc	Metric	Count	No	Total completed **read** command data observed external to a target-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
total_time_metric_based_write_io_count	tmwtIOc	Metric	Count	No	Total completed **write** command data observed external to a target-ITL-flow record.
total_time_metric_based_read_io_bytes	tmrtIOb	Metric	Count	No	Total completed **read** command data observed external to a target-ITL-flow record, in bytes.
total_time_metric_based_write_io_bytes	tmwtIOb	Metric	Count	No	Total completed **write** command data observed external to a target-ITL-flow record, in bytes.
read_io_rate	rIOr	Metric	IOs per second	Yes	The rate of **read** commands observed external to a LUN on a target-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_rate	prIOr	Metric	IOs per second	No	The peak rate of **read** commands observed external to a target-ITL-flow record.
write_io_rate	wIOr	Metric	IOs per second	Yes	The rate of **write** commands observed external to a target-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_rate	pwIOr	Metric	IOs per second	No	The peak rate of **write** commands observed external to a target-ITL-flow record.
read_io_bandwidth	rIObw	Metric	Bytes per second	Yes	The **read** command bandwidth observed external to a target-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_bandwidth	prIObw	Metric	Bytes per second	No	Peak **read** command bandwidth observed external to a target-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_bandwidth	wIObw	Metric	Bytes per second	Yes	The **write** command bandwidth observed external to a target-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_bandwidth	pwIObw	Metric	Bytes per second	No	Peak **write** command bandwidth observed external to a target-ITL-flow record.
read_io_size_min	rIOsMi	Metric	Bytes	Yes	Minimum **read** command size observed external to a target-ITL-flow record.
read_io_size_max	rIOsMa	Metric	Bytes	Yes	Maximum **read** command size observed external to a target-ITL-flow record.
write_io_size_min	wIOsMi	Metric	Bytes	Yes	Minimum **write** command size observed external to a target-ITL-flow record.
write_io_size_max	wIOsMa	Metric	Bytes	Yes	Maximum **write** command size observed external to a target-ITL-flow record.
read_io_completion_time_min	rIOctMi	Metric	Microseconds	Yes	Minimum **read** command completion time observed external to a target-ITL-flow record.
read_io_completion_time_max	rIOctMa	Metric	Microseconds	Yes	Maximum **read** command completion time observed external to a target-ITL-flow record.
write_io_completion_time_min	wIOctMi	Metric	Microseconds	Yes	Minimum **write** command completion time observed external to a target-ITL-flow record.
write_io_completion_time_max	wIOctMa	Metric	Microseconds	Yes	Maximum **write** command completion time observed external to a target-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
read_io_initiation_time_min	rIOitMi	Metric	Microseconds	Yes	Minimum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.
read_io_initiation_time_max	rIOitMa	Metric	Microseconds	Yes	Maximum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_min	wIOitMi	Metric	Microseconds	Yes	Minimum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_initiation_time_max	wIOitMa	Metric	Microseconds	Yes	Maximum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.
read_io_inter_gap_time_min	rIOigtMi	Metric	Microsecond	Yes	Minimum **read** command intergap time observed external to a target-ITL-flow record. read_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_inter_gap_time_max	rIOigtMa	Metric	Microsecond	Yes	Maximum **read** command intergap time observed external to a target-ITL-flow record. read_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_min	wIOigtMi	Metric	Microseconds	Yes	Minimum **write** command intergap time observed external to a target-ITL-flow record. write_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_max	wIOigtMa	Metric	Microseconds	Yes	Maximum **write** command intergap time observed external to a target-ITL-flow record. write_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
read_io_aborts	rIOa	Metric	Count	Yes	Number of **read** command aborts observed external to a target-ITL-flow record.
write_io_aborts	wIOa	Metric	Count	Yes	Number of **write** command aborts observed external to a target-ITL-flow record.
read_io_failures	rIOf	Metric	Count	Yes	Number of **read** command failures observed external to a target-ITL-flow record.
write_io_failures	wIOf	Metric	Count	Yes	Number of **write** command failures observed external to a target-ITL-flow record.
read_io_scsi_check_condition_count	rIOSchcoct	Metric	Count	No	Number of **read** command check conditions seen external to a target-ITL-flow record.
write_io_scsi_check_condition_count	wIOSchcoct	Metric	Count	No	Number of **write** command check conditions seen external to a target-ITL-flow record.
read_io_scsi_busy_count	rIOsbc	Metric	Count	No	Number of **read** command busy status seen external to a target-ITL-flow record.
write_io_scsi_busy_count	wIOsbc	Metric	Count	No	Number of **write** command busy status seen external to a target-ITL-flow record.
read_io_scsi_reservation_conflict_count	rIOSrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to a target-ITL-flow record.
write_io_scsi_reservation_conflict_count	wIOSrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to a target-ITL-flow record.
read_io_scsi_queue_full_count	rIOSQfct	Metric	Count	No	Number of **read** command queue full status seen external to a target-ITL-flow record.
write_io_scsi_queue_full_count	wIOSQfct	Metric	Count	No	Number of **write** command queue full status seen external to a target-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.
total_busy_period	totBsy	Metric	Count	No	The total time for which the view instances have been active.
total_write_io_first_burst_count	totWrFirBu	Metric	Count	No	Accumulated total **write** command first burst observed external to a switch port.
total_write_io_array_delay_time	totWrArrDel	Metric	Count	No	Accumulated total **write** command array delays observed external to a switch port.
total_write_io_host_delay_time	totWrHosDel	Metric	Count	No	Accumulated total **write** command host delays observed external to a switch port.
total_write_io_sequences_count	totWrSeq	Metric	Count	No	Accumulated total **write** command sequences observed external to a switch port.
write_io_host_delay_time_min	wrHosDelMn	Metric	Count	No	Minimum **write** command host delays observed external to a switch port.
write_io_host_delay_time_max	wrHosDelMx	Metric	Count	No	Maximum **write** command host delays observed external to a switch port.
write_io_array_delay_time_max	wrArrDelMx	Metric	Count	No	Maximum **write** command array delays observed external to a switch port.
multisequence_exchange_write_io_sequences_min	wrIoSeqMn	Metric	Count	No	Minimum **write** command multisequence exchange sequences observed external to a switch port.
multisequence_exchange_write_io_sequences_max	wrIoSeqMx	Metric	Count	No	Maximum **write** command multisequence exchange sequences observed external to a switch port.

Target ITN Flow View Instance (nvme_target_itn_flow)



Note The flow metrics for *Target ITN Flow View Instance* are applicable only for the NVMe analytics type.

Table 15: Flow Metrics for Target ITN Flow View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
port	port	Key	Text	No	A switch port where the SAN Analytics feature is enabled.
vsan	vsan	Key	Count	No	VSAN configured on a switch port with IO since last clearing of metrics.
app_id	app_id	Key	Count	No	Application identifier for an application external to a switch port.
target_id	did	Key	Text	No	Target Fibre Channel ID external to a switch port with IO since last clearing of metrics.
initiator_id	sid	Key	Text	No	Initiator Fibre Channel ID where the IO transactions are being performed on a target external to a switch port.
connection_id	ci	Key	Count	No	The NVMe connection id external to a switch port with IO since last clearing of metrics.
namespace_id	ni	Key	Count	No	The namespace ID is the NVMe controller's unique identifier for the namespace and can be set to a value between 1 and 255. It is analogous to a logical unit number (LUN) in SCSI.
active_io_read_count	raIO	Metadata	Count	Yes	Number of outstanding **read** command counts associated with a target-ITL-flow record.
active_io_write_count	waIO	Metadata	Count	Yes	Number of outstanding **write** command counts associated with a target-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
total_read_io_count	rtIO	Metric	Count	Yes	Total **read** command data observed external to a target-ITL-flow record.
total_write_io_count	wtIO	Metric	Count	Yes	Total **write** command data observed external to a target-ITL-flow record.
total_seq_read_io_count	rstIOc	Metric	Count	No	Total sequential **read** command data observed external to a target-ITL-flow record.
total_seq_write_io_count	wrstIOc	Metric	Count	No	Total sequential **write** command data observed external to a target-ITL-flow record.
total_read_io_time	rtIOt	Metric	Microseconds	No	Accumulated total **read** command completion time observed external to a target-ITL-flow record. You can use this information to compute the average read IO completion time.
total_write_io_time	wtIOt	Metric	Microseconds	No	Accumulated total **write** command completion time observed external to a target-ITL-flow record. You can use this information to compute the average **write** command completion time.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
total_read_io_initiation_time	rtIOint	Metric	Microseconds	no	Accumulated total **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ commands or the first txfr_rdy for WRITE commands) observed external to a target-ITL-flow record. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average read IO initiation time.
total_write_io_initiation_time	wtIOint	Metric	Microseconds	No	Accumulated total **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-ITL-flow record. The initiation time is sometimes referred to as **data access latency**. You can use this information to compute the average **write** command initiation time.
total_read_io_bytes	rtIOb	Metric	Bytes	Yes	Total **read** command data that is observed external to a target-ITL-flow record.
total_write_io_bytes	wtIOb	Metric	Bytes	Yes	Total **write** command data observed external to a target-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_read_io_inter_gap_time	rtIOigt	Metric	Microsecond	No	Accumulated total **read** command intergap time observed external to a target-ITL-flow record. You can use this information to compute the average read IO intergap time.
total_write_io_inter_gap_time	wtIOigt	Metric	Microseconds	No	Accumulated total **write** command intergap time data observed external to a target-ITL-flow record. You can use this information to compute the average **write** command intergap time.
total_time_metric_based_read_io_count	tmrtIOc	Metric	Count	No	Total completed **read** command data observed external to a target-ITL-flow record.
total_time_metric_based_write_io_count	tmwtIOc	Metric	Count	No	Total completed **write** command data observed external to a target-ITL-flow record.
total_time_metric_based_read_io_bytes	tmrtIOb	Metric	Count	No	Total completed **read** command data observed external to a target-ITL-flow record, in bytes.
total_time_metric_based_write_io_bytes	tmwtIOb	Metric	Count	No	Total completed **write** command data observed external to a target-ITL-flow record, in bytes.
read_io_rate	rIOr	Metric	IOs per second	Yes	The rate of **read** commands observed external to a LUN on a target-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_rate	prIOr	Metric	IOs per second	No	The peak rate of **read** commands observed external to a target-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_rate	wIOr	Metric	IOs per second	Yes	The rate of **write** commands observed external to a target-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_rate	pwIOr	Metric	IOs per second	No	The peak rate of **write** commands observed external to a target-ITL-flow record.
read_io_bandwidth	rIObw	Metric	Bytes per second	Yes	The **read** command bandwidth observed external to a target-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_read_io_bandwidth	prIObw	Metric	Bytes per second	No	Peak **read** command bandwidth observed external to a target-ITL-flow record.
write_io_bandwidth	wIObw	Metric	Bytes per second	Yes	The **write** command bandwidth observed external to a target-ITL-flow record. This metric is the average value collected over a 4-second interval from the NPU.
peak_write_io_bandwidth	pwIObw	Metric	Bytes per second	No	Peak **write** command bandwidth observed external to a target-ITL-flow record.
read_io_size_min	rIOsMi	Metric	Bytes	Yes	Minimum **read** command size observed external to a target-ITL-flow record.
read_io_size_max	rIOsMa	Metric	Bytes	Yes	Maximum **read** command size observed external to a target-ITL-flow record.
write_io_size_min	wIOsMi	Metric	Bytes	Yes	Minimum **write** command size observed external to a target-ITL-flow record.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_size_max	wIOsMa	Metric	Bytes	Yes	Maximum **write** command size observed external to a target-ITL-flow record.
read_io_completion_time_min	rIOctMi	Metric	Microseconds	Yes	Minimum **read** command completion time observed external to a target-ITL-flow record.
read_io_completion_time_max	rIOctMa	Metric	Microseconds	Yes	Maximum **read** command completion time observed external to a target-ITL-flow record.
write_io_completion_time_min	wIOctMi	Metric	Microseconds	Yes	Minimum **write** command completion time observed external to a target-ITL-flow record.
write_io_completion_time_max	wIOctMa	Metric	Microseconds	Yes	Maximum **write** command completion time observed external to a target-ITL-flow record.
read_io_initiation_time_min	rIOitMi	Metric	Microseconds	Yes	Minimum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.
read_io_initiation_time_max	rIOitMa	Metric	Microseconds	Yes	Maximum **read** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_initiation_time_min	wIOitMi	Metric	Microseconds	Yes	Minimum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.
write_io_initiation_time_max	wIOitMa	Metric	Microseconds	Yes	Maximum **write** command initiation time (time gap between the IO command and the first response from the storage; the first response can be the first data frame for READ or txfer_rdy for WRITE) observed external to a target-ITL-flow record. The initiation time is sometimes referred to as **data access latency**.
read_io_inter_gap_time_min	rIOigtMi	Metric	Microsecond	Yes	Minimum **read** command intergap time observed external to a target-ITL-flow record. read_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_inter_gap_time_max	rIOigtMa	Metric	Microsecond	Yes	Maximum **read** command intergap time observed external to a target-ITL-flow record. read_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_inter_gap_time_min	wIOigtMi	Metric	Microseconds	Yes	Minimum **write** command intergap time observed external to a target-ITL-flow record. write_io_inter_gap_time_min is the duration between successive IO commands and is measured in 1/256th of a microsecond.
write_io_inter_gap_time_max	wIOigtMa	Metric	Microseconds	Yes	Maximum **write** command intergap time observed external to a target-ITL-flow record. write_io_inter_gap_time_max is the duration between successive IO commands and is measured in 1/256th of a microsecond.
read_io_aborts	rIOa	Metric	Count	Yes	Number of **read** command aborts observed external to a target-ITL-flow record.
write_io_aborts	wIOa	Metric	Count	Yes	Number of **write** command aborts observed external to a target-ITL-flow record.
read_io_failures	rIOf	Metric	Count	Yes	Number of **read** command failures observed external to a target-ITL-flow record.
write_io_failures	wIOf	Metric	Count	Yes	Number of **write** command failures observed external to a target-ITL-flow record.
read_io_nvme_lba_out_of_range_count	rIONLbaoorct	Metric	Count	No	Number of **read** command *lba out of range* errors seen.
write_io_nvme_lba_out_of_range_count	wIONLbaoorct	Metric	Count	No	Number of **write** command *lba out of range* errors seen.
read_io_nvme_ns_not_ready_count	rIOnNsnrc	Metric	Count	No	Number of **read** command *namespace not ready* errors seen.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	**Short Name**				
write_io_nvme_ns_not_ready_count	wIOnNsnrc	Metric	Count	No	Number of **write** command *namespace not ready* errors seen.
read_io_nvme_reservation_conflict_count	rIONrecct	Metric	Count	No	Number of **read** command reservation conflicts seen external to a target-ITN-flow record.
write_io_nvme_reservation_conflict_count	wIONrecct	Metric	Count	No	Number of **write** command reservation conflicts seen external to a target-ITN-flow record.
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.
total_busy_period	totBsy	Metric	Count	No	The total time for which the view instances have been active.
total_write_io_first_burst_count	totWrFirBu	Metric	Count	No	Accumulated total **write** command first burst observed external to a switch port.
total_write_io_array_delay_time	totWrArrDel	Metric	Count	No	Accumulated total **write** command array delays observed external to a switch port.
total_write_io_host_delay_time	totWrHosDel	Metric	Count	No	Accumulated total **write** command host delays observed external to a switch port.
total_write_io_sequences_count	totWrSeq	Metric	Count	No	Accumulated total **write** command sequences observed external to a switch port.
write_io_host_delay_time_min	wrHosDelMn	Metric	Count	No	Minimum **write** command host delays observed external to a switch port.
write_io_host_delay_time_max	wrHosDelMx	Metric	Count	No	Maximum **write** command host delays observed external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_array_delay_time_max	wrArrDelMx	Metric	Count	No	Maximum **write** command array delays observed external to a switch port.
multisequence_exchange_write_io_sequences_min	wrIoSeqMn	Metric	Count	No	Minimum **write** command multisequence exchange sequences observed external to a switch port.
multisequence_exchange_write_io_sequences_max	wrIoSeqMx	Metric	Count	No	Maximum **write** command multisequence exchange sequences observed external to a switch port.

Initiator IO Flow View Instance (scsi_initiator_io and nvme_initiator_io)

Table 16: Flow Metrics for Initiator IO Flow View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
port	port	Key	Text	No	A switch port where the SAN Analytics feature is enabled.
vsan	vsan	Key	Count	No	VSAN configured on a switch port with IO since last clearing of metrics.
app_id	app_id	Key	Count	No	Application identifier for an application external to a switch port.
initiator_id	sid	Key	Text	No	Initiator Fibre Channel ID where the IO transactions are being performed on an initiator external to a switch port.
target_id	did	Key	Text	No	Initiator Fibre Channel ID external to a switch port with IO since last clearing of metrics.
lun	lun	Key	Count	No	Logical-unit-number (LUN) that is associated with an initiator where IOs are performed.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
connection_id	ci	Key	Count	No	The NVMe connection id external to a switch port with IO since last clearing of metrics.
namespace_id	ni	Key	Count	No	The namespace ID is the NVMe controller's unique identifier for the namespace and can be set to a value between 1 and 255. It is analogous to a logical unit number (LUN) in SCSI.
exchange_id	oxid	Key	Count	No	Exchange ID, assigned by the originator, that is associated with an IO transaction.
extended_exchange_id	exXID	Metadata	Count	No	Extended exchange ID, assigned by the responder, that is associated with an IO transaction.
io_lba	iolba	Metadata	Count	No	Logical block address (LBA) where IO is performed.
io_size	iosize	Metadata	Count	No	Size of the IO, that is, the number of bytes of data involved in the IO.
io_start_time	iost	Metric	Count	Yes	Time stamp at which IO started.
sampling_start_time	samStm	Metric	UNIX time	No	Start of the sampling time interval.
sampling_end_time	samEtm	Metric	UNIX time	No	End of the sampling time interval.
total_busy_period	totBsy	Metric	Count	No	The total time for which the view instances have been active.
total_write_io_first_burst_count	totWrFirBu	Metric	Count	No	Accumulated total **write** command first burst observed external to a switch port.
total_write_io_array_delay_time	totWrArrDel	Metric	Count	No	Accumulated total **write** command array delays observed external to a switch port.
total_write_io_host_delay_time	totWrHosDel	Metric	Count	No	Accumulated total **write** command host delays observed external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
total_write_io_sequences_count	totWrSeq	Metric	Count	No	Accumulated total **write** command sequences observed external to a switch port.
write_io_host_delay_time_min	wrHosDelMn	Metric	Count	No	Minimum **write** command host delays observed external to a switch port.
write_io_host_delay_time_max	wrHosDelMx	Metric	Count	No	Maximum **write** command host delays observed external to a switch port.
write_io_array_delay_time_max	wrArrDelMx	Metric	Count	No	Maximum **write** command array delays observed external to a switch port.
multisequence_exchange_write_io_sequences_min	wrIoSeqMn	Metric	Count	No	Minimum **write** command multisequence exchange sequences observed external to a switch port.
multisequence_exchange_write_io_sequences_max	wrIoSeqMx	Metric	Count	No	Maximum **write** command multisequence exchange sequences observed external to a switch port.

Target IO Flow View Instance (scsi_target_io and nvme_target_io)

Table 17: Flow Metrics for Target IO Flow View Instance

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
port	port	Key	Text	No	A switch port where the SAN Analytics feature is enabled.
vsan	vsan	Key	Count	No	VSAN configured on a switch port with IO since last clearing of metrics.
app_id	app_id	Key	Count	No	Application identifier for an application external to a switch port.
target_id	did	Key	Text	No	Target Fibre Channel ID external to a switch port with IO since last clearing of metrics.
initiator_id	sid	Key	Text	No	Initiator Fibre Channel ID where the IO transactions are being performed on a target external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
lun	lun	Key	Count	No	Logical-unit-number (LUN) that is associated with a target where IOs are performed.
connection_id	ci	Key	Count	No	The NVMe connection id external to a switch port with IO since last clearing of metrics.
namespace_id	ni	Key	Count	No	The namespace ID is the NVMe controller's unique identifier for the namespace and can be set to a value between 1 and 255. It is analogous to a logical unit number (LUN) in SCSI.
exchange_id	oxid	Key	Count	No	Exchange ID, assigned by the originator, that is associated with an IO transaction.
extended_exchange_id	exXID	Metadata	Count	No	Extended exchange ID, assigned by the responder, that is associated with an IO transaction.
io_lba	iolba	Metadata	Count	No	Logical block address (LBA) where IO is performed.
io_size	iosize	Metadata	Count	No	Size of the IO, that is, the number of bytes of data involved in the IO.
io_start_time	iost	Metric	Count	Yes	Time stamp at which IO started.
total_busy_period	totBsy	Metric	Count	No	The total time for which the view instances have been active.
total_write_io_first_burst_count	totWrFirBu	Metric	Count	No	Accumulated total **write** command first burst observed external to a switch port.
total_write_io_array_delay_time	totWrArrDel	Metric	Count	No	Accumulated total **write** command array delays observed external to a switch port.
total_write_io_host_delay_time	totWrHosDel	Metric	Count	No	Accumulated total **write** command host delays observed external to a switch port.
total_write_io_sequences_count	totWrSeq	Metric	Count	No	Accumulated total **write** command sequences observed external to a switch port.
write_io_host_delay_time_min	wrHosDelMn	Metric	Count	No	Minimum **write** command host delays observed external to a switch port.

Flow Metric		Type	Unit	Sortable?	Description
Long Name	Short Name				
write_io_host_delay_time_max	wrHosDelMx	Metric	Count	No	Maximum **write** command host delays observed external to a switch port.
write_io_array_delay_time_max	wrArrDelMx	Metric	Count	No	Maximum **write** command array delays observed external to a switch port.
multisequence_exchange_write_io_sequences_min	wrIoSeqMn	Metric	Count	No	Minimum **write** command multisequence exchange sequences observed external to a switch port.
multisequence_exchange_write_io_sequences_max	wrIoSeqMx	Metric	Count	No	Maximum **write** command multisequence exchange sequences observed external to a switch port.

Interface Counters

The following table provides information about the list of supported interface counters:

Table 18: Interface Counters

Counter Name	Description
BB_SCr Tx credit increment actions	The number of times port detected lost R_RDYs and corrected the local credit accounting by incrementing *TX B2B credit available* status.
BB_SCs credit resend actions	The number of times port detected lost frames and corrected the peer credit accounting by resending extra credits (R_RDYs).
CTS SPI Mismatch	FCSP-ESP frames having mismatched security association identifier.
Delimiter Errors	The number of times frames are received with delimiter (start-of-frame [So]) or end-of-frame [EoF]) errors.
Diag Generated Frames	Test frames generated by an internal packet generator.
ELS Frames Discard	The number of times Extended Link Service (ELS) frames were discarded.
EOF Frames	The number of times invalid EoF frames were received.
FC2 Discards	The number of times Class 2 frames were dropped at egress due to timeout, abort, offline, and so on.
FC2 InFrames	The number of times Class 2 frames were received.
FC2 InOctets	The number of Class 2 ingress octets.
FC2 OutFrames	The number of times Class 2 frames were transmitted.

Counter Name	Description
FC2 OutOctets	The number of Class 2 egress octets.
FC2 PRJT Frames	The number of Class 2 received frames rejected by port.
FC3 Discards	The number of times Class 3 frames were dropped at egress due to timeout, abort, offline, and so on.
FC3 InFrames	The number of times Class 3 frames were received.
FC3 InOctets	The number of Class 3 ingress octets.
FC3 OutFrames	The number of times Class 3 frames were transmitted.
FC3 OutOctets	The number of Class 3 egress octets.
FCF Discards	The number of times Class F frames were dropped at egress due to timeout, abort, offline, and so on.
FCF InFrames	The number of times Class F frames were received.
FCF InOctets	The number of Class F ingress octets.
FCF OutFrames	The number of times Class F frames were transmitted.
FCF OutOctets	The number of Class F egress octets.
FC Out Errors	The number of times Fibre Channel errors were transmitted.
FIB Drops	The number of frames that were dropped due to forwarding lookup miss on a port group.
FLRR In	The number of times a Fibre Channel port received Link Reset Responses (LRR) primitive sequences when the port was active.
FLRR Out	The number of times a Fibre Channel port transmitted Link Reset Responses (LRR) primitive sequences when the port was active.
Frames Too Long	The number of times long frames were received beyond the configured maximum Fibre Channel frame size.
Frames Too Short	The number of times short frames were received below the configured minimum Fibre Channel frame size.
Framing Error Frames	The number of times framing error frames were received.
HC InBroadcast Pkts	The number of times broadcast packets were received.
HC InMulticast Pkts	The number of times multicast packets were received.
HC InOctets	The number of high-capacity ingress octets.
HC InUcast Pkts	The number of times unicast packets were received.
HC OutBroadcast Pkts	The number of times broadcast packets were transmitted.

Counter Name	Description
HC OutMulticast Pkts	The number of times multicast packets were transmitted.
HC OutOctets	The number of high-capacity egress octets.
HC OutUCast Pkts	The number of times unicast packets were transmitted.
IfIn Discards	The number of times ingress frames were dropped.
IfIn Errors	The number of ingress errors.
IfIn Frames	The number of ingress frames.
IfIn Octets	The number of ingress frames, in bytes.
IfOut Discards	The number of times egress frames were dropped.
IfOut Errors	The number of egress errors.
IfOut Frames	The number of egress frames.
IfOut Octets	The number of egress frames, in bytes.
In Broadcast Pkts	The number of times broadcast frames were received.
In Discards	The number of times discards were received.
In Errors	The number of errors received.
In Multicast Pkts	The number of times multicast frames were received.
InOctets	The number of ingress octets.
In UCast Pkts	The number of times unicast packets were received.
Invalid CRCs	The number of times frames with Internal Cyclic Redundancy Check (CRC) errors were received by a port.
Invalid Tx Words	The number of times invalid Tx words were received by a port.
Jabber Frames In	The number of times a Fibre Channel port receives frames that are longer than the maximum frame length and also have a CRC or FCS error.
Link Failures	The number of times a Fibre Channel link was down because of the received Offline Sequence (OLS) or Not Operational Sequence (NOS) errors.
Link Reset Ins	The number of times a Fibre Channel port received Link Reset (LR) primitive sequences when the port was active.
Link Reset Outs	The number of times a Fibre Channel port transmitted LR primitive sequences when the port was active.
LIP F8 In	The number of times Loop Initiation Protocol (LIP) F8 primitives were received.

Counter Name	Description
LIP F8 Out	The number of times LIP F8 primitives were transmitted.
Non Lip F8 In	The number of times non-LIP F8 primitives were received.
Non Lip F8 Out	The number of times non-LIP F8 primitives were transmitted.
NOS In	The number of times NOS were received by a port.
NOS Out	The number of times NOS were transmitted by a port.
OLS Ins	The number of times a Fibre Channel port received OLS primitive sequences.
OLS Outs	The number of times a Fibre Channel port transmitted OLS primitive sequences.
Other Drops	The number of frames that were dropped due to other errors on a port group.
Out Broadcast Pkts	The number of times broadcast frames were transmitted.
Out Discards	The number of times discards were transmitted.
Out Multicast Pkts	The number of times multicast frames were transmitted.
Out Octets	The number of egress octets.
Out Ucast Pkts	The number of times unicast packets were transmitted.
Runt Frames In	The number of times a Fibre Channel port receives frames that are shorter than the minimum allowable frame length regardless of the CRC or FCS error.
Rx B2B credit transitions to zero for VL 0	The number of times the interface was at zero Rx BB_credits remaining for virtual link 0.
Rx B2B credit transitions to zero for VL 1	The number of times the interface was at zero Rx BB_credits remaining for virtual link 1.
Rx B2B credit transitions to zero for VL 2	The number of times the interface was at zero Rx BB_credits remaining for virtual link 2.
Rx B2B credit transitions to zero for VL 3	The number of times the interface was at zero Rx BB_credits remaining for virtual link 3.
Rx BBCredit Transition to Zero	The number of times the interface was at zero Rx BB_credits remaining.
Rx BBZ VL0	Rx B2B credit transitions to zero for VL 0.
Rx BBZ VL1	Rx B2B credit transitions to zero for VL 1.
Rx BBZ VL2	Rx B2B credit transitions to zero for VL 2.
Rx BBZ VL3	Rx B2B credit transitions to zero for VL 3.
Sig Loss	The number of times a Fibre Channel port experienced loss of laser signal.

Counter Name	Description
Sync Loss	The number of times a Fibre Channel port experienced loss of synchronization in Rx.
Timeout Discards	Any frame dropped in the switch due to congestion-drop timeout or no-credit-drop timeout is accounted as timeout discard. Increment in timeout discard indicates congestion in transmit direction.
Tx B2B credit transitions to zero for VL 0	The number of times the interface was at zero Tx BB_credits remaining and unable to transmit on virtual link 0.
Tx B2B credit transitions to zero for VL 1	The number of times the interface was at zero Tx BB_credits remaining and unable to transmit on virtual link 1.
Tx B2B credit transitions to zero for VL 2	The number of times the interface was at zero Tx BB_credits remaining and unable to transmit on virtual link 2.
Tx B2B credit transitions to zero for VL 3	The number of times the interface was at zero Tx BB_credits remaining and unable to transmit on virtual link 3.
Tx BBCredit Transition to Zero	The number of times the interface was at zero Tx BB_credits remaining and unable to transmit.
Tx BBZ VL0	Tx B2B credit transitions to zero for VL 0.
Tx BBZ VL1	Tx B2B credit transitions to zero for VL 1.
Tx BBZ VL2	Tx B2B credit transitions to zero for VL 2.
Tx BBZ VL3	Tx B2B credit transitions to zero for VL 3.
TxWait	TxWait counter is an aggregate time counter that counts the transmit wait time of a port. Transmit wait is a condition when a port lacks transmit credit available (tx b2b = 0) and frames are waiting for transmission. Counter is in increments 2.5 microseconds. To calculate the count value in seconds, multiply the TxWait count by 2.5 and divide by 1,000,000.
TxWait 2.5us due to lack of transmit credits	The number of times an interface was at zero Tx credits for 2.5 microseconds.
TxWait 2.5us due to lack of transmit credits for VL 0	The number of times an interface was at zero Tx credits for 2.5 microseconds on virtual link 0.
TxWait 2.5us due to lack of transmit credits for VL 1	The number of times an interface was at zero Tx credits for 2.5 microseconds on virtual link 1.
TxWait 2.5us due to lack of transmit credits for VL 2	The number of times an interface was at zero Tx credits for 2.5 microseconds on virtual link 2.
TxWait 2.5us due to lack of transmit credits for VL 3	The number of times an interface was at zero Tx credits for 2.5 microseconds on virtual link 3.
TxWait VL0	TxWait 2.5us due to lack of transmit credits for VL 0.

Counter Name	Description
TxWait VL1	TxWait 2.5us due to lack of transmit credits for VL 1.
TxWait VL2	TxWait 2.5us due to lack of transmit credits for VL 2.
TxWait VL3	TxWait 2.5us due to lack of transmit credits for VL 3.
Unknown Class Frames	The number of times unknown class frames were received.
Xbar Drops	The number of frames that were dropped due to fabric switching (crossbar) errors on a port group.
Zone Drops	The number of frames that were dropped due to zoning not configured for a device on a port group.

SAN Telemetry Streaming Proto Files — Release 9.4(1)

This section provides information about the *.proto* files that are used in compact GPB.

The following information displays the contents of the *telemetry_bis.proto* file:

```
/* ---------------------------------------------------------------------------
 * telemetry_bis.proto - Telemetry protobuf definitions
 *
 * August 2023
 *
 * Copyright (c) 2023 by Cisco Systems, Inc.
 *
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 * limitations under the License.
 * ---------------------------------------------------------------------------
 */

syntax = "proto3";

option go_package = "telemetry_bis";

option cc_enable_arenas = true;

 /*
  * Common message used as a header to both compact and self-describing
  * telemetry messages.
  */

message Telemetry {
  oneof node_id {
    string node_id_str = 1;
    //  bytes node_id_uuid = 2;              // not produced
```

```
  }
  oneof subscription {
    string   subscription_id_str = 3;
    //  uint32   subscription_id = 4;        // not produced
  }
  // string   sensor_path = 5;               // not produced
  string   encoding_path = 6;
  // string   model_version = 7;             // not produced
  uint64   collection_id = 8;
  uint64   collection_start_time = 9;
  uint64   msg_timestamp = 10;
  repeated TelemetryField data_gpbkv = 11;
  TelemetryGPBTable data_gpb = 12;
  uint64   collection_end_time = 13;
  // uint64   heartbeat_sequence_number = 14; // not produced
}

/*
 * Messages used to export content in GPB K/V form.
 *
 * The set of messages in this .proto are sufficient to decode all
 * telemetry messages.
 */

message TelemetryField {
  uint64         timestamp = 1;
  string         name = 2;
  oneof value_by_type {
    bytes          bytes_value = 4;
    string         string_value = 5;
    bool           bool_value = 6;
    uint32         uint32_value = 7;
    uint64         uint64_value = 8;
    sint32         sint32_value = 9;
    sint64         sint64_value = 10;
    double         double_value = 11;
    float          float_value = 12;
  }
  repeated TelemetryField fields = 15;
}

/*
 * Messages used to export content in compact GPB form
 *
 * Per encoding-path .proto files are required to decode keys/content
 * pairs below.
 */

message TelemetryGPBTable {
  repeated TelemetryRowGPB row = 1;
}

message TelemetryRowGPB {
   uint64 timestamp = 1;
   bytes keys = 10;
   bytes content = 11;
}
```

The following information displays the contents of the *fabric_telemetry.proto* file in Release 9.4(1):

```
/* ------------------------------------------------------------------------------
* fabric_telemetry.proto - Fabric Telemetry protobuf definitions
*
```

```
* July 2023
*
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* distributed under the License is distributed on an "AS IS" BASIS,
* WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
* See the License for the specific language governing permissions and
* limitations under the License.
* ------------------------------------------------------------------------------
*/

syntax = "proto3";

option go_package = "fabric_telemetry";

option cc_enable_arenas = true;

message ControlInformation {
    string version = 1;
    uint32 chunk_sequence = 2;
    uint32 total_chunks_count = 3;
}

message FlowRecordsTable {
    ControlInformation control_info = 1;
    repeated FlowRecordRow row = 2;
}

message FlowRecordRow {
    string port = 1;
    uint32 app_id = 2;
    uint32 vsan = 3;
    string target_id = 4;
    string initiator_id = 5;
    string lun = 6;
    string exchange_id = 7;
    uint32 scsi_target_count = 8;
    uint32 scsi_initiator_count = 9;
    uint32 io_app_count = 10;
    uint32 logical_port_count = 11;
    uint32 scsi_target_app_count = 12;
    uint32 scsi_initiator_app_count = 13;
    uint32 active_io_read_count = 14;
    uint32 active_io_write_count = 15;
    uint32 scsi_target_tl_flow_count = 16;
    uint32 scsi_target_it_flow_count = 17;
    uint32 scsi_initiator_it_flow_count = 18;
    uint32 scsi_target_itl_flow_count = 19;
    uint32 scsi_initiator_itl_flow_count = 20;
    uint32 scsi_target_lun_count = 21;
    uint32 scsi_target_entity_it_flow_count = 22;
    uint32 scsi_initiator_entity_it_flow_count = 23;
    uint32 scsi_target_entity_itl_flow_count = 24;
    uint32 scsi_initiator_entity_itl_flow_count = 25;
    uint64 sampling_start_time = 26;
    uint64 sampling_end_time = 27;
    string extended_exchange_id = 28;
```

```
string io_lba = 29;
uint32 io_size = 30;
uint64 total_read_io_count = 31;
uint64 total_write_io_count = 32;
uint64 total_seq_read_io_count = 33;
uint64 total_seq_write_io_count = 34;
uint64 total_read_io_time = 35;
uint64 total_write_io_time = 36;
uint64 total_read_io_initiation_time = 37;
uint64 total_write_io_initiation_time = 38;
uint64 total_read_io_bytes = 39;
uint64 total_write_io_bytes = 40;
uint64 total_read_io_inter_gap_time = 41;
uint64 total_write_io_inter_gap_time = 42;
uint64 total_time_metric_based_read_io_count = 43;
uint64 total_time_metric_based_write_io_count = 44;
uint64 total_time_metric_based_read_io_bytes = 45;
uint64 total_time_metric_based_write_io_bytes = 46;
uint64 io_start_time = 47;
uint32 read_io_rate = 48;
uint32 peak_read_io_rate = 49;
uint32 write_io_rate = 50;
uint32 peak_write_io_rate = 51;
uint32 read_io_bandwidth_deprecated = 52;          /* modified in Release 9.4(1)*/
uint32 peak_read_io_bandwidth_deprecated = 53;     /* modified in Release 9.4(1)*/
uint32 write_io_bandwidth_deprecated = 54;         /* modified in Release 9.4(1)*/
uint32 peak_write_io_bandwidth_deprecated = 55;    /* modified in Release 9.4(1)*/
uint32 read_io_size_min = 56;
uint32 read_io_size_max = 57;
uint32 write_io_size_min = 58;
uint32 write_io_size_max = 59;
uint32 read_io_completion_time_min = 60;
uint32 read_io_completion_time_max = 61;
uint32 write_io_completion_time_min = 62;
uint32 write_io_completion_time_max = 63;
uint32 read_io_initiation_time_min = 64;
uint32 read_io_initiation_time_max = 65;
uint32 write_io_initiation_time_min = 66;
uint32 write_io_initiation_time_max = 67;
uint32 read_io_inter_gap_time_min = 68;
uint32 read_io_inter_gap_time_max = 69;
uint32 write_io_inter_gap_time_min = 70;
uint32 write_io_inter_gap_time_max = 71;
uint32 peak_active_io_read_count = 72;
uint32 peak_active_io_write_count = 73;
uint32 read_io_aborts = 74;
uint32 write_io_aborts = 75;
uint32 read_io_failures = 76;
uint32 write_io_failures = 77;
uint32 read_io_timeouts = 78;
uint32 write_io_timeouts = 79;
uint32 read_io_scsi_check_condition_count = 80;
uint32 write_io_scsi_check_condition_count = 81;
uint32 read_io_scsi_busy_count = 82;
uint32 write_io_scsi_busy_count = 83;
uint32 read_io_scsi_reservation_conflict_count = 84;
uint32 write_io_scsi_reservation_conflict_count = 85;
uint32 read_io_scsi_queue_full_count = 86;
uint32 write_io_scsi_queue_full_count = 87;
uint32 read_io_rate_exceed_count = 88;
uint32 write_io_rate_exceed_count = 89;
uint32 read_io_bandwidth_exceed_count = 90;
uint32 write_io_bandwidth_exceed_count = 91;
uint32 read_io_size_min_exceed_count = 92;
```

```
uint32 read_io_size_max_exceed_count = 93;
uint32 write_io_size_min_exceed_count = 94;
uint32 write_io_size_max_exceed_count = 95;
uint32 read_io_initiation_time_min_exceed_count = 96;
uint32 read_io_initiation_time_max_exceed_count = 97;
uint32 write_io_initiation_time_min_exceed_count = 98;
uint32 write_io_initiation_time_max_exceed_count = 99;
uint32 read_io_completion_time_min_exceed_count = 100;
uint32 read_io_completion_time_max_exceed_count = 101;
uint32 write_io_completion_time_min_exceed_count = 102;
uint32 write_io_completion_time_max_exceed_count = 103;
uint32 read_io_inter_gap_time_min_exceed_count = 104;
uint32 read_io_inter_gap_time_max_exceed_count = 105;
uint32 write_io_inter_gap_time_min_exceed_count = 106;
uint32 write_io_inter_gap_time_max_exceed_count = 107;
uint32 read_io_abort_exceed_count = 108;
uint32 write_io_abort_exceed_count = 109;
uint32 read_io_failure_exceed_count = 110;
uint32 write_io_failure_exceed_count = 111;
uint64 total_abts_count = 112;
uint32 namespace_id = 113;
string connection_id = 114;
uint32 nvme_target_count = 115;
uint32 nvme_initiator_count = 116;
uint32 nvme_target_app_count = 117;
uint32 nvme_initiator_app_count = 118;
uint32 nvme_target_tn_flow_count = 119;
uint32 nvme_target_it_flow_count = 120;
uint32 nvme_initiator_it_flow_count = 121;
uint32 nvme_target_itn_flow_count = 122;
uint32 nvme_initiator_itn_flow_count = 123;
uint32 nvme_target_namespace_count = 124;
uint32 nvme_target_entity_it_flow_count = 125;
uint32 nvme_initiator_entity_it_flow_count = 126;
uint32 nvme_target_entity_itn_flow_count = 127;
uint32 nvme_initiator_entity_itn_flow_count = 128;
uint32 read_io_nvme_lba_out_of_range_count = 129;
uint32 write_io_nvme_lba_out_of_range_count = 130;
uint32 read_io_nvme_ns_not_ready_count = 131;
uint32 write_io_nvme_ns_not_ready_count = 132;
uint32 read_io_nvme_reservation_conflict_count = 133;
uint32 write_io_nvme_reservation_conflict_count = 134;
uint32 read_io_nvme_capacity_exceeded_count = 135;
uint32 write_io_nvme_capacity_exceeded_count = 136;
uint64 total_host_delay_time = 137;
uint64 total_write_sequences = 138;
uint32 host_delay_time_min = 139;
uint32 host_delay_time_max = 140;
uint32 write_sequences_min = 141;
uint32 write_sequences_max = 142;
uint32 read_io_initiate_miss_count = 143;
uint32 write_io_initiate_miss_count = 144;
uint32 read_write_io_rate_exceed_count = 145;
uint32 read_write_io_bandwidth_exceed_count = 146;
uint32 read_write_io_abort_exceed_count = 147;
uint32 read_write_io_failure_exceed_count = 148;
uint32 active_read_write_io_exceed_count = 149;
uint32 read_io_size_min_max_exceed_count = 150;
uint32 write_io_size_min_max_exceed_count = 151;
uint32 read_io_initiation_time_min_max_exceed_count = 152;
uint32 write_io_initiation_time_min_max_exceed_count = 153;
uint32 read_io_completion_time_min_max_exceed_count = 154;
uint32 write_io_completion_time_min_max_exceed_count = 155;
uint32 read_io_inter_gap_time_min_max_exceed_count = 156;
```

```
    uint32 write_io_inter_gap_time_min_max_exceed_count = 157;
    uint32 host_delay_time_min_max_exceed_count = 158;
    uint32 write_sequences_min_max_exceed_count = 159;
    uint64 creation_time = 160;
    uint64 last_update_time = 161;
    uint64 last_export_time = 162;
    uint64 last_clear_on_export_time = 163;
    uint64 last_clear_time = 164;
    uint64 last_set_time = 165;
    string vmid = 166;
    f64specific f64metrics=167;
    uint64 read_io_bandwidth = 168;                        /* new in Release 9.4(1)*/
    uint64 peak_read_io_bandwidth = 169;                   /* new in Release 9.4(1)*/
    uint64 write_io_bandwidth = 170;                       /* new in Release 9.4(1)*/
    uint64 peak_write_io_bandwidth = 171;                  /* new in Release 9.4(1)*/

}
```

SAN Telemetry Streaming Proto Files — Prior to Release 9.4(1)

This section provides information about the *.proto* files that are used in compact GPB.

The following information displays the contents of the *telemetry_bis.proto* file:

```
/* ---------------------------------------------------------------------------
 * telemetry_bis.proto - Telemetry protobuf definitions
 *
 * August 2016
 *
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 *
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 * WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
 * See the License for the specific language governing permissions and
 * limitations under the License.
 * ---------------------------------------------------------------------------
 */

syntax = "proto3";

option go_package = "telemetry_bis";

option cc_enable_arenas = true;

 /*
  * Common message used as a header to both compact and self-describing
  * telemetry messages.
  */

message Telemetry {
  oneof node_id {
    string node_id_str = 1;
    //  bytes node_id_uuid = 2;              // not produced
  }
```

```
  oneof subscription {
    string   subscription_id_str = 3;
    //  uint32   subscription_id = 4;        // not produced
  }
  // string   sensor_path = 5;               // not produced
  string   encoding_path = 6;
  // string   model_version = 7;             // not produced
  uint64   collection_id = 8;
  uint64   collection_start_time = 9;
  uint64   msg_timestamp = 10;
  repeated TelemetryField data_gpbkv = 11;
  TelemetryGPBTable data_gpb = 12;
  uint64   collection_end_time = 13;
  // uint64   heartbeat_sequence_number = 14; // not produced
}

/*
 * Messages used to export content in GPB K/V form.
 *
 * The set of messages in this .proto are sufficient to decode all
 * telemetry messages.
 */

message TelemetryField {
  uint64         timestamp = 1;
  string         name = 2;
  oneof value_by_type {
    bytes          bytes_value = 4;
    string         string_value = 5;
    bool           bool_value = 6;
    uint32         uint32_value = 7;
    uint64         uint64_value = 8;
    sint32         sint32_value = 9;
    sint64         sint64_value = 10;
    double         double_value = 11;
    float          float_value = 12;
  }
  repeated TelemetryField fields = 15;
}

/*
 * Messages used to export content in compact GPB form
 *
 * Per encoding-path .proto files are required to decode keys/content
 * pairs below.
 */

message TelemetryGPBTable {
  repeated TelemetryRowGPB row = 1;
}

message TelemetryRowGPB {
   uint64 timestamp = 1;
   bytes keys = 10;
   bytes content = 11;
}
```

The following information displays the contents of the *fabric_telemetry.proto* file for Release prior to 9.4(1):

Note The *exceed_count* counters in the output will be supported in a future Cisco MDS NX-OS Release.

```
/* ------------------------------------------------------------------------------
* fabric_telemetry.proto - Fabric Telemetry protobuf definitions
*
* July 2018
*
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* distributed under the License is distributed on an "AS IS" BASIS,
* WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
* See the License for the specific language governing permissions and
* limitations under the License.
* ------------------------------------------------------------------------------
*/

syntax = "proto3";

option go_package = "fabric_telemetry";

option cc_enable_arenas = true;

message ControlInformation {
    string version = 1;
    uint32 chunk_sequence = 2;
    uint32 total_chunks_count = 3;
}

message FlowRecordsTable {
    ControlInformation control_info = 1;
    repeated FlowRecordRow row = 2;
}

message FlowRecordRow {
    string port = 1;
    uint32 app_id = 2;
    uint32 vsan = 3;
    string target_id = 4;
    string initiator_id = 5;
    string lun = 6;
    string exchange_id = 7;
    uint32 scsi_target_count = 8;
    uint32 scsi_initiator_count = 9;
    uint32 io_app_count = 10;
    uint32 logical_port_count = 11;
    uint32 scsi_target_app_count = 12;
    uint32 scsi_initiator_app_count = 13;
    uint32 active_io_read_count = 14;
    uint32 active_io_write_count = 15;
    uint32 scsi_target_tl_flow_count = 16;
    uint32 scsi_target_it_flow_count = 17;
    uint32 scsi_initiator_it_flow_count = 18;
    uint32 scsi_target_itl_flow_count = 19;
    uint32 scsi_initiator_itl_flow_count = 20;
    uint32 scsi_target_lun_count = 21;
    uint32 scsi_target_entity_it_flow_count = 22;
    uint32 scsi_initiator_entity_it_flow_count = 23;
    uint32 scsi_target_entity_itl_flow_count = 24;
```

```
uint32 scsi_initiator_entity_itl_flow_count = 25;
uint64 sampling_start_time = 26;
uint64 sampling_end_time = 27;
string extended_exchange_id = 28;
string io_lba = 29;
uint32 io_size = 30;
uint64 total_read_io_count = 31;
uint64 total_write_io_count = 32;
uint64 total_seq_read_io_count = 33;
uint64 total_seq_write_io_count = 34;
uint64 total_read_io_time = 35;
uint64 total_write_io_time = 36;
uint64 total_read_io_initiation_time = 37;
uint64 total_write_io_initiation_time = 38;
uint64 total_read_io_bytes = 39;
uint64 total_write_io_bytes = 40;
uint64 total_read_io_inter_gap_time = 41;
uint64 total_write_io_inter_gap_time = 42;
uint64 total_time_metric_based_read_io_count = 43;
uint64 total_time_metric_based_write_io_count = 44;
uint64 total_time_metric_based_read_io_bytes = 45;
uint64 total_time_metric_based_write_io_bytes = 46;
uint64 io_start_time = 47;
uint32 read_io_rate = 48;
uint32 peak_read_io_rate = 49;
uint32 write_io_rate = 50;
uint32 peak_write_io_rate = 51;
uint32 read_io_bandwidth = 52;
uint32 peak_read_io_bandwidth = 53;
uint32 write_io_bandwidth = 54;
uint32 peak_write_io_bandwidth = 55;
uint32 read_io_size_min = 56;
uint32 read_io_size_max = 57;
uint32 write_io_size_min = 58;
uint32 write_io_size_max = 59;
uint32 read_io_completion_time_min = 60;
uint32 read_io_completion_time_max = 61;
uint32 write_io_completion_time_min = 62;
uint32 write_io_completion_time_max = 63;
uint32 read_io_initiation_time_min = 64;
uint32 read_io_initiation_time_max = 65;
uint32 write_io_initiation_time_min = 66;
uint32 write_io_initiation_time_max = 67;
uint32 read_io_inter_gap_time_min = 68;
uint32 read_io_inter_gap_time_max = 69;
uint32 write_io_inter_gap_time_min = 70;
uint32 write_io_inter_gap_time_max = 71;
uint32 peak_active_io_read_count = 72;
uint32 peak_active_io_write_count = 73;
uint32 read_io_aborts = 74;
uint32 write_io_aborts = 75;
uint32 read_io_failures = 76;
uint32 write_io_failures = 77;
uint32 read_io_timeouts = 78;
uint32 write_io_timeouts = 79;
uint32 read_io_scsi_check_condition_count = 80;
uint32 write_io_scsi_check_condition_count = 81;
uint32 read_io_scsi_busy_count = 82;
uint32 write_io_scsi_busy_count = 83;
uint32 read_io_scsi_reservation_conflict_count = 84;
uint32 write_io_scsi_reservation_conflict_count = 85;
uint32 read_io_scsi_queue_full_count = 86;
uint32 write_io_scsi_queue_full_count = 87;
uint32 read_io_rate_exceed_count = 88;
```

```
uint32 write_io_rate_exceed_count = 89;
uint32 read_io_bandwidth_exceed_count = 90;
uint32 write_io_bandwidth_exceed_count = 91;
uint32 read_io_size_min_exceed_count = 92;
uint32 read_io_size_max_exceed_count = 93;
uint32 write_io_size_min_exceed_count = 94;
uint32 write_io_size_max_exceed_count = 95;
uint32 read_io_initiation_time_min_exceed_count = 96;
uint32 read_io_initiation_time_max_exceed_count = 97;
uint32 write_io_initiation_time_min_exceed_count = 98;
uint32 write_io_initiation_time_max_exceed_count = 99;
uint32 read_io_completion_time_min_exceed_count = 100;
uint32 read_io_completion_time_max_exceed_count = 101;
uint32 write_io_completion_time_min_exceed_count = 102;
uint32 write_io_completion_time_max_exceed_count = 103;
uint32 read_io_inter_gap_time_min_exceed_count = 104;
uint32 read_io_inter_gap_time_max_exceed_count = 105;
uint32 write_io_inter_gap_time_min_exceed_count = 106;
uint32 write_io_inter_gap_time_max_exceed_count = 107;
uint32 read_io_abort_exceed_count = 108;
uint32 write_io_abort_exceed_count = 109;
uint32 read_io_failure_exceed_count = 110;
uint32 write_io_failure_exceed_count = 111;
uint64 total_abts_count = 112;
uint32 namespace_id = 113;
string connection_id = 114;
uint32 nvme_target_count = 115;
uint32 nvme_initiator_count = 116;
uint32 nvme_target_app_count = 117;
uint32 nvme_initiator_app_count = 118;
uint32 nvme_target_tn_flow_count = 119;
uint32 nvme_target_it_flow_count = 120;
uint32 nvme_initiator_it_flow_count = 121;
uint32 nvme_target_itn_flow_count = 122;
uint32 nvme_initiator_itn_flow_count = 123;
uint32 nvme_target_namespace_count = 124;
uint32 nvme_target_entity_it_flow_count = 125;
uint32 nvme_initiator_entity_it_flow_count = 126;
uint32 nvme_target_entity_itn_flow_count = 127;
uint32 nvme_initiator_entity_itn_flow_count = 128;
uint32 read_io_nvme_lba_out_of_range_count = 129;
uint32 write_io_nvme_lba_out_of_range_count = 130;
uint32 read_io_nvme_ns_not_ready_count = 131;
uint32 write_io_nvme_ns_not_ready_count = 132;
uint32 read_io_nvme_reservation_conflict_count = 133;
uint32 write_io_nvme_reservation_conflict_count = 134;
uint32 read_io_nvme_capacity_exceeded_count = 135;
uint32 write_io_nvme_capacity_exceeded_count = 136;
uint64 total_host_delay_time = 137;
uint64 total_write_sequences = 138;
uint32 host_delay_time_min = 139;
uint32 host_delay_time_max = 140;
uint32 write_sequences_min = 141;
uint32 write_sequences_max = 142;
uint32 read_io_initiate_miss_count = 143;
uint32 write_io_initiate_miss_count = 144;
uint32 read_write_io_rate_exceed_count = 145;
uint32 read_write_io_bandwidth_exceed_count = 146;
uint32 read_write_io_abort_exceed_count = 147;
uint32 read_write_io_failure_exceed_count = 148;
uint32 active_read_write_io_exceed_count = 149;
uint32 read_io_size_min_max_exceed_count = 150;
uint32 write_io_size_min_max_exceed_count = 151;
uint32 read_io_initiation_time_min_max_exceed_count = 152;
```

```
    uint32 write_io_initiation_time_min_max_exceed_count = 153;
    uint32 read_io_completion_time_min_max_exceed_count = 154;
    uint32 write_io_completion_time_min_max_exceed_count = 155;
    uint32 read_io_inter_gap_time_min_max_exceed_count = 156;
    uint32 write_io_inter_gap_time_min_max_exceed_count = 157;
    uint32 host_delay_time_min_max_exceed_count = 158;
    uint32 write_sequences_min_max_exceed_count = 159;
    uint64 creation_time = 160;
    uint64 last_update_time = 161;
    uint64 last_export_time = 162;
    uint64 last_clear_on_export_time = 163;
    uint64 last_clear_time = 164;
    uint64 last_set_time = 165;
    string vmid = 166;
    f64specific f64metrics=167;

}
```

Appendix