



# **VSI LAN Bandwidth Monitoring Guide for OpenVMS x86-64**

**Operating System:** VSI OpenVMS x86-64 Version 9.2-3 or higher

## VSI LAN Bandwidth Monitoring Guide for OpenVMS x86-64



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# 1. Introduction to LAN Bandwidth Monitoring

LAN bandwidth monitoring collects and displays LAN device traffic with fine granularity. The LAN common routines (SYS\$LOADABLE\_IMAGES:SYS\$LAN\_CSMACD.EXE) uses a one-second timer for various things including transmit timeout handling, DAT (Duplicate Address Test) timing, and MOP (Maintenance Operations Protocol) System ID timing. The timer runs four times per second, with transmit timeout checking done every 250 milliseconds, and most other things done once per second.

Once per second, the LAN driver for each LAN device records the packets and bytes sent and received over the last second and records an entry in an S2-space buffer. Each 32-byte entry is called a *bucket* and looks like so:

```
+-----+
|                                             | 0
+---  Entry start time (EXE$GQ_SYSTIME)  ---+
|                                             |
+-----+
|           Packets sent                    | 8
+-----+
|           Packets received                | 12
+-----+
|                                             | 16
+---          Bytes sent                    ---+
|                                             |
+-----+
|                                             | 24
+---          Bytes received                ---+
|                                             |
+-----+
```

Once per second, the packets and bytes are calculated for the one-second period just concluding.

A threshold value is defined as the total bytes transmitted and received in the one-second period. By default, this value is 10 000 bytes. A second where the total bytes is less than the threshold value is considered noise or background activity that is not worth tallying explicitly. The threshold value can be set by the LAN Control Program (LANCP) utility.

If the threshold value is zero, buckets contain data for one or more seconds as follows:

- Zero bytes were recorded for the second; zero buckets are coalesced with subsequent zero buckets.
- Non-zero bytes were recorded for the second; each bucket is one second.

If the threshold value is non-zero, buckets contain data for one or more seconds as follows:

- Zero bytes were recorded for the second; zero buckets are coalesced with subsequent zero buckets.
- Bytes recorded were less than the threshold; these buckets are coalesced with subsequent buckets that did not exceed the threshold.
- Bytes recorded were above the threshold; each bucket is one second.

One-second periods where the traffic exceeds the threshold are significant. One-second periods with zero traffic are also significant; either there is legitimately no activity, or the network could have an issue.

When entries are coalesced, the time coverage of the bandwidth buffer can be much greater than the nominal size of the buffer in one-second buckets.

## 2. Use Cases of Monitoring LAN Bandwidth

The information provided by LAN bandwidth monitoring can be useful to anyone interested in the LAN traffic processed by a LAN device, looking at a finer granularity than inspecting the LAN device counters periodically. It is also useful for analyzing a system crash dump. Being able to see the traffic before the time of the crash answers questions about network saturation or network outages.

A system manager may periodically look at the LAN bandwidth to see how an application operates on the LAN devices on the system. A system manager can create a batch job to read the bandwidth data once per day and restart the monitoring, or just record historical data for as long as the bandwidth buffer lasts before the buffer is wrapped.

The size of the buffer can be adjusted to collect a minimum of one year of data, extended by threshold value or zero-byte entry coalescing. A system manager could run a batch job once a day to collect the data and restart monitoring.

## 3. LANCP Bandwidth Commands

This section lists the LANCP commands that are helpful for bandwidth monitoring. For further information on the LANCP utility and LANCP commands, refer to the relevant section in the [VSI OpenVMS System Management Utilities Reference Manual, Volume I: A–L \[https://docs.vmssoftware.com/vsi-openvms-system-management-utilities-reference-manual-volume-i-a-l/#d0e28651\]](https://docs.vmssoftware.com/vsi-openvms-system-management-utilities-reference-manual-volume-i-a-l/#d0e28651) or the LANCP online Help.

To display bandwidth data, use the following command:

```
LANCP> SHOW DEVICE /BANDWIDTH [devname]
```

The following qualifiers provide additional functionality:

Qualifier	Function
<b>/DUMPFIL</b> <i>E=file-spec</i>	Writes data to a dump file
<b>/INPUTFIL</b> <i>E=file-spec</i>	Reads data from a dump file
<b>/EXPANDED</b>	Shows data expanded to one-second buckets
<b>/SUMMARY</b>	Shows summary data
<b>/SINCE</b> [ <i>=timespec</i> ]	Shows data since time
<b>/DURATION</b> [ <i>=timespec</i> ]	Shows data for time duration starting at <b>/SINCE</b>
<b>/LAST</b> [ <i>=timespec</i> ]	Shows data for last time duration
<b>/REVERSE</b>	Displays data latest to oldest
<b>/OUTPUTFIL</b> <i>E=file-spec</i>	Redirects output to an output file

The following additional qualifiers allow you to select certain entries:

Qualifier	Function
<b>/1MB</b>	Shows 1 Mbit/second and larger entries
<b>/10MB</b>	Shows 10 Mbit/second and larger entries
<b>/100MB</b>	Shows 100 Mbit/second and larger entries

Qualifier	Function
/1GB	Shows 1 Gbit/second and larger entries
/2GB	Shows 2 Gbit/second and larger entries
/5GB	Shows 5 Gbit/second and larger entries
/10GB	Shows 10 Gbit/second and larger entries
/ [NO] ZERO	Shows zero/non-zero entries

To display bandwidth summary data included in the configuration display, use the following command:

```
LANCP> SHOW CONFIGURATION /BANDWIDTH [devname]
```

To display bandwidth settings, use the following command:

```
LANCP> SHOW BANDWIDTH
```

To display permanent device database settings, use one of the following commands:

- LANCP> LIST BANDWIDTH

**LIST BANDWIDTH** lists all devices.

- LANCP> LIST DEVICE /BANDWIDTH [*devname*]

**LIST DEVICE /BANDWIDTH** only lists the devices specified. If no *devname* is given, it is functionally equivalent to **LIST BANDWIDTH**.

To override default bandwidth settings, use one of the following commands:

```
LANCP> SET DEVICE / [NO] BANDWIDTH=(HOURS=n, THRESHOLD=nbytes, RESTART, DEFAULT) devname
```

```
LANCP> DEFINE DEVICE / [NO] BANDWIDTH=(HOURS=n, THRESHOLD=nbytes) devname
```

where:

HOURS= <i>n</i>	Specifies size of the buffers in hours (3600 buckets per hour)
THRESHOLD= <i>nbytes</i>	Specifies the threshold value
RESTART	Restarts monitoring, discarding existing data
DEFAULT	Restarts monitoring with default settings, discarding existing data

To override the default size of the bandwidth buffer for all LAN devices, set the LAN\_FLAGS system parameter as follows.

The default size is 2048 buckets (64 kilobytes). The maximum size is 67 hours (7 megabytes of buffer space) set by the LAN\_FLAGS system parameter. The time without compression is with a threshold value of zero bytes. With compression (threshold larger than 0 bytes), the time depends on the actual traffic.

Bits <9:11> is the number of megabytes of bandwidth buffer requested as follows:

LAN_FLAGS	Buckets	Mbytes	Bytes	TimeNoCompress	TimeCompressed
0x00000000	2048	1/16	65 536	0.6 hours	> 0.6 hours

LAN_FLAGS	Buckets	Mbytes	Bytes	TimeNoCompress	TimeCompressed
0x00000200	32 768	1	1 048 576	9.1 hours	> 9.1 hours
0x00000400	65 536	2	2 097 152	18.2 hours	> 18.2 hours
0x00000600	98 304	3	3 145 728	27.3 hours	> 27.3 hours
0x00000800	131 072	4	4 194 304	36.4 hours	> 36.4 hours
0x00000A00	163 840	5	5 242 880	45.5 hours	> 45.5 hours
0x00000C00	196 608	6	6 291 456	54.6 hours	> 54.6 hours
0x00000E00	229 376	7	7 340 032	63.7 hours	> 63.7 hours

To save bandwidth data for later analysis, use the following command:

```
LANCP> SHOW DEVICE /BANDWIDTH /DUMPFILE=file-spec /OUTPUTFILE=nl: devname
```

To access the previously saved data, use the following command:

```
LANCP> SHOW DEVICE /BANDWIDTH /INPUTFILE=file-spec devname
```

To extract bandwidth data from a crash dump, use the following commands:

```
$ ANALYZE/SYSTEM
SDA> LAN BANDWIDTH /DUMPFILE[=file-spec] /DEVICE=devname
```

## Note

For more information on using the OpenVMS System Dump Analyzer (SDA), refer to the relevant section in the [VSI OpenVMS System Analysis Tools Manual \[https://docs.vmssoftware.com/vsi-openvms-system-analysis-tools-manual/#PART1\]](https://docs.vmssoftware.com/vsi-openvms-system-analysis-tools-manual/#PART1).

To turn off bandwidth monitoring, use one of the following commands:

```
LANCP> SET DEVICE/NOBANDWIDTH devname
LANCP> SET DEVICE/NOBANDWIDTH/ALL
```

## Using the /SUMMARY Qualifier

The **/SUMMARY** qualifier converts the raw data displayed by the **SHOW DEVICE/BANDWIDTH** command into one-second buckets, calculates a running total for each interval, and then displays the maximum values for each interval. The **/SINCE**, **/DURATION**, and **/LAST** qualifiers allow users to specify the desired time period to look at when calculating the running totals. The interval is the size of the window to look at the data. For example, the one-hour interval is the one-hour period that recorded the largest bandwidth over the period selected (as measured from second to second across the entire period).

## 4. LAN Bandwidth Monitoring Examples

This section provides several example scenarios.

### 4.1. Example 1

This section looks at the resultant bandwidth data after doing an FTP (TCP/IP is running on EIA).

1. The following example displays the bandwidth data over the last 60 seconds:

```
$ MCR LANCP SHOW DEVICE/BANDWIDTH/LAST EIA
```

```
VMS Device Bandwidth EIA0 (4-DEC-2025 22:52:11.75):
4-DEC-2025 22:51:12.69 to 4-DEC-2025 22:52:11.75 (00:00:59.05)
2048 buckets, buckets < 10000 bytes coalesced (threshold)
```

	Duration	PkXmt	PkRcv	BytXmt	BytRcv	Mb/s	Code
4-DEC-2025 22:51:18.93 :	4.16 : EIA0	0	0	0	0	0	Zero
4-DEC-2025 22:51:23.09 :	1.04 : EIA0	0	1	0	81	0	<1Mb
4-DEC-2025 22:51:24.13 :	5.20 : EIA0	0	0	0	0	0	Zero
4-DEC-2025 22:51:29.33 :	1.04 : EIA0	0	1	0	81	0	<1Mb
4-DEC-2025 22:51:30.37 :	5.20 : EIA0	0	0	0	0	0	Zero
4-DEC-2025 22:51:35.57 :	1.04 : EIA0	0	1	0	81	0	<1Mb
4-DEC-2025 22:51:36.61 :	5.20 : EIA0	0	0	0	0	0	Zero
4-DEC-2025 22:51:41.81 :	1.04 : EIA0	0	1	0	81	0	<1Mb
4-DEC-2025 22:51:42.85 :	4.16 : EIA0	0	0	0	0	0	Zero
4-DEC-2025 22:51:47.01 :	1.04 : EIA0	293	844	16144	1205485	9	1Mb
4-DEC-2025 22:51:48.05 :	1.04 : EIA0	61	168	3354	238800	2	1Mb
4-DEC-2025 22:51:49.09 :	3.12 : EIA0	0	0	0	0	0	Zero
4-DEC-2025 22:51:52.21 :	2.08 : EIA0	0	5	0	589	0	<1Mb
4-DEC-2025 22:51:54.29 :	1.04 : EIA0	0	0	0	0	0	Zero
4-DEC-2025 22:51:55.33 :	9.36 : EIA0	0	12	0	1385	0	<1Mb
4-DEC-2025 22:52:04.69 :	1.04 : EIA0	0	0	0	0	0	Zero
4-DEC-2025 22:52:05.73 :	1.04 : EIA0	0	1	0	81	0	<1Mb
4-DEC-2025 22:52:06.77 :	5.20 : EIA0	0	0	0	0	0	Zero
4-DEC-2025 22:52:11.97 :	1.04 : EIA0	0	1	0	81	0	<1Mb
4-DEC-2025 22:52:13.01 :	4.16 : EIA0	0	0	0	0	0	Zero
4-DEC-2025 22:52:17.17 :	1.65 : EIA0	0	1	0	81	0	<1Mb

You can see times when there was no data (zero buckets), others with some small amount of data, and then the actual FTP data transfer with over 1 Mbit/second for 2 seconds:

2. The following example also displays the bandwidth data over the last 60 seconds, but restricts the view to one-second intervals with 1 Mbit/second or more:

```
$ MCR LANCP SHOW DEVICE/BANDWIDTH/LAST/1MB EIA
```

```
VMS Device Bandwidth EIA0 (4-DEC-2025 22:52:18.82):
4-DEC-2025 22:51:18.93 to 4-DEC-2025 22:52:18.82 (00:00:59.88)
2048 buckets, buckets < 10000 bytes coalesced (threshold)
```

	Duration	PkXmt	PkRcv	BytXmt	BytRcv	Mb/s	Code
4-DEC-2025 22:51:47.01 :	1.04 : EIA0	293	844	16144	1205485	9	1Mb
4-DEC-2025 22:51:48.05 :	1.04 : EIA0	61	168	3354	238800	2	1Mb

Note that the starting time of the 60 second display is 7 seconds different.

3. The following example uses the **/SUMMARY** qualifier to look at bandwidth use over a 4-hour 52-minute period. It shows intervals for 1, 10, 60, 600, 3600, and 14 400 seconds, as well as the entire 4-hour 52-minute period:

```
$ MCR LANCP SHOW DEVICE/BANDWIDTH/SUMMARY EIA
```

```
VMS Device Bandwidth EIA0 (8-DEC-2025 18:15:35.10):
8-DEC-2025 13:22:38.59 to 8-DEC-2025 18:15:35.10 (04:52:56.51)
2047 buckets, buckets < 10000 bytes coalesced (threshold)
```

Start Time	High Points For Each Interval							
	--Interval--		PkXmt	PkRcv	BytXmt	BytRcv	Mb/s	
8-DEC-2025 14:40:17.59	1.00	1s	EIA0	0	3	0	1071	0
8-DEC-2025 18:02:38.59	10.00	10s	EIA0	0	12	0	2187	0
8-DEC-2025 14:41:17.59	60.00	1m	EIA0	0	64	0	4428	0
8-DEC-2025 13:44:22.59	600.00	10m	EIA0	2	263	308	19515	0
8-DEC-2025 13:42:40.59	3600.00	1h	EIA0	12	973	1848	84915	0
8-DEC-2025 13:26:39.59	14400.00	4h	EIA0	48	1767	7392	179564	0
8-DEC-2025 13:22:38.59	17577s		EIA0	58	1940	8932	203464	0

The 10-second interval, for example, shows the highest 10-second period over the entire period and it was recorded at the 18:02:38.59 mark.

## 4.2. Example 2

This section looks at the data shown by the **/LAST** and **/SUMMARY** qualifiers after running a test program to generate traffic.

1. The following example uses the **/LAST** qualifier to display bandwidth data for the last 10 seconds:

```
$ MCR LANCP SHOW DEVICE/BANDWIDTH EIA/LAST=0:00:10
```

```
VMS Device Bandwidth EIA0 (2-SEP-2025 20:13:20.96):
2-SEP-2025 20:13:11.05 to 2-SEP-2025 20:13:20.96 (00:00:09.90)
838 buckets, buckets < 10000 bytes coalesced (threshold)
```

	Duration		PkXmt	PkRcv	BytXmt	BytRcv	Mb/s	Code
2-SEP-2025 20:13:11.05 :	1.04 :	EIA0	51854	51926	40660056	40924832	628	100Mb
2-SEP-2025 20:13:12.09 :	1.04 :	EIA0	44614	44707	34981302	35233303	540	100Mb
2-SEP-2025 20:13:13.13 :	1.06 :	EIA0	55322	55307	43381014	43590525	656	100Mb
2-SEP-2025 20:13:14.19 :	1.04 :	EIA0	53056	53049	41602536	41806804	642	100Mb
2-SEP-2025 20:13:15.23 :	1.04 :	EIA0	42974	43072	33696514	33946120	520	100Mb
2-SEP-2025 20:13:16.27 :	1.04 :	EIA0	57333	57280	44956463	45143800	693	100Mb
2-SEP-2025 20:13:17.31 :	1.04 :	EIA0	50183	50176	39347600	39544960	607	100Mb
2-SEP-2025 20:13:18.35 :	1.04 :	EIA0	43223	42890	33894674	33804487	521	100Mb
2-SEP-2025 20:13:19.39 :	1.57 :	EIA0	48553	48906	38069182	38544156	390	100Mb

2. The following example also displays the data for the last 10 seconds (a few seconds later), but this time the **/SUMMARY** qualifier is used to show the summary data:

```
$ MCR LANCP SHOW DEVICE/BANDWIDTH EIA/LAST=0:00:10/SUMMARY
```

```
VMS Device Bandwidth EIA0 (2-SEP-2025 20:14:18.72):
2-SEP-2025 20:14:09.37 to 2-SEP-2025 20:14:18.72 (00:00:09.34)
893 buckets, buckets < 10000 bytes coalesced (threshold)
```

Start Time	High Points For Each Interval							
	--Interval--		PkXmt	PkRcv	BytXmt	BytRcv	Mb/s	
2-SEP-2025 20:14:11.37	1.00	1s	EIA0	48650	48686	38148580	38370748	612
2-SEP-2025 20:14:09.37	9s		EIA0	381440	381590	299096640	300738915	513

3. The following example displays the data for the last 30 seconds. The number of buckets is increasing as a new bucket is written to the bandwidth buffer every second:

```
$ MCR LANCP SHOW DEVICE/BANDWIDTH EIA/LAST=0:00:30
```

```
VMS Device Bandwidth EIA0 (2-SEP-2025 20:14:40.78):
2-SEP-2025 20:14:11.45 to 2-SEP-2025 20:14:40.78 (00:00:29.32)
915 buckets, buckets < 10000 bytes coalesced (threshold)
```

	Duration		PkXmt	PkRcv	BytXmt	BytRcv	Mb/s	Code
2-SEP-2025 20:14:11.45 :	1.04 :	EIA0	51340	51377	40257721	40492055	621	100Mb
2-SEP-2025 20:14:12.49 :	1.04 :	EIA0	44696	44598	35048428	35149452	540	100Mb
2-SEP-2025 20:14:13.53 :	1.04 :	EIA0	50481	50541	39583715	39832875	611	100Mb
2-SEP-2025 20:14:14.57 :	1.04 :	EIA0	45803	45291	35913056	35692825	551	100Mb
2-SEP-2025 20:14:15.61 :	1.04 :	EIA0	50223	50735	39381244	39985272	611	100Mb
2-SEP-2025 20:14:16.65 :	1.04 :	EIA0	46673	46494	36597332	36643736	563	100Mb

```

2-SEP-2025 20:14:17.69 : 1.04 : EIA0 49792 49775 39043152 39228290 602 100Mb
2-SEP-2025 20:14:18.73 : 1.04 : EIA0 25104 25340 19684674 19973212 305 100Mb
2-SEP-2025 20:14:19.77 : 1.04 : EIA0 46128 46139 36170118 36363075 558 100Mb
2-SEP-2025 20:14:20.81 : 1.04 : EIA0 47104 47110 36935424 37128454 570 100Mb
2-SEP-2025 20:14:21.85 : 1.05 : EIA0 45571 45558 35734852 35903593 546 100Mb
2-SEP-2025 20:14:22.90 : 1.04 : EIA0 52797 52853 41397956 41656992 639 100Mb
2-SEP-2025 20:14:23.94 : 1.07 : EIA0 46529 46489 36484802 36637574 547 100Mb
2-SEP-2025 20:14:25.01 : 1.04 : EIA0 48942 48882 38376530 38524474 592 100Mb
2-SEP-2025 20:14:26.05 : 1.04 : EIA0 50269 50334 39417789 39670136 608 100Mb
2-SEP-2025 20:14:27.09 : 1.07 : EIA0 43161 42971 33845097 33868012 506 100Mb
2-SEP-2025 20:14:28.16 : 1.04 : EIA0 49691 49863 38961734 39296132 602 100Mb
2-SEP-2025 20:14:29.20 : 1.04 : EIA0 50884 50871 39901337 40095146 615 100Mb
2-SEP-2025 20:14:30.24 : 1.05 : EIA0 43443 43273 34065261 34102094 519 100Mb
2-SEP-2025 20:14:31.29 : 1.04 : EIA0 50865 51014 39884435 40207803 616 100Mb
2-SEP-2025 20:14:32.33 : 1.04 : EIA0 45272 45128 35496551 35564763 547 100Mb
2-SEP-2025 20:14:33.37 : 1.05 : EIA0 49688 49810 38963959 39255854 596 100Mb
2-SEP-2025 20:14:34.42 : 1.04 : EIA0 49640 49507 38921609 39019196 600 100Mb
2-SEP-2025 20:14:35.46 : 1.04 : EIA0 43919 44018 34438120 34692416 532 100Mb
2-SEP-2025 20:14:36.50 : 1.04 : EIA0 45941 45972 36025273 36231606 556 100Mb
2-SEP-2025 20:14:37.54 : 1.04 : EIA0 50706 50664 39760316 39927670 613 100Mb
2-SEP-2025 20:14:38.58 : 1.05 : EIA0 47184 47186 36998154 37189708 565 100Mb
2-SEP-2025 20:14:39.63 : 1.15 : EIA0 52122 52254 40867769 41181442 571 100Mb

```

#### 4. The following example shows the **/SUMMARY** data for the last 30 seconds:

```
$ MCR LANCPC SHOW DEVICE/BANDWIDTH EIA/LAST=0:00:30/SUMMARY
```

```
VMS Device Bandwidth EIA0 (2-SEP-2025 20:14:46.87):
2-SEP-2025 20:14:17.69 to 2-SEP-2025 20:14:46.87 (00:00:29.17)
920 buckets, buckets < 10000 bytes coalesced (threshold)
```

Start Time	High Points For Each Interval				Mb/s		
	--Interval--		PkXmt	PkRcv		BytXmt	BytRcv
2-SEP-2025 20:14:39.69	1.00 1s	EIA0	50019	50143	39219096	39517536	630
2-SEP-2025 20:14:31.69	10.00 10s	EIA0	461928	462040	362207380	364144768	581
2-SEP-2025 20:14:17.69	29s	EIA0	1274929	1275014	999703952	1004871677	550

### 4.3. Example 3

This section looks at running a test program to generate traffic, then crashing the system and looking at the resultant dump file.

#### 1. The following command is used to manually crash the system:

```
$ RUN SYS$SYSTEM:OPCCRASH.EXE
```

```
Open user files prevent dismounting host device _VMS$DKA0:
Cannot deinstall page/swap file DISK$VMS_DKA0:[SYS0.SYSEXEXE]PAGEFILE.SYS;1
(index # 254)
```

VSI Dump Kernel - Handles Shutdown/Reboot/Crash Dumps

```
** Dumping error logs to the system disk (VMS$DKA0:)
** Error logs dumped to VMS$DKA0:[SYS0.SYSEXEXE]SYS$ERRLOG.DMP
** (used 52 out of 64 available blocks)
** Dumping memory to the system disk (VMS$DKA0:)
```

#### 2. Then, after reboot, the following command is used to look at the dump file:

```
$ ANALYZE/CRASH_DUMP file-spec
```

```
OpenVMS system dump analyzer
...analyzing an x86-64 interleaved memory dump...
```

```
Dump taken on 2-SEP-2025 20:41:32.22 using version XGR0-K6N
```

OPERATOR, Operator requested system shutdown

where *file-spec* is the full path to the dump file.

3. SDA does not display bandwidth data, so the following command is used to extract the data to a dump file:

```
SDA> LAN BANDWIDTH/DUMP=BAND.DMP/DEVICE=EIA
LAN$SDA(X-88) Extension on VMS (Red Hat KVM) crash at 2-SEP-2025 20:41:32.22
-----
Wrote bandwidth data for EIA to BAND.DMP
To view, LANCP SHOW DEVICE/BANDWIDTH/INPUT=BAND.DMP
```

4. Finally, LANCP is used to look at the bandwidth data using the dump file created with SDA as the input file for LANCP. The following example shows the **/SUMMARY** data:

```
$ MCR LANCP SHOW DEVICE EIA/BANDWIDTH/INPUT=BAND.DMP/SUMMARY

VMS Device Bandwidth EIA0 (2-SEP-2025 21:00:19.71):
2-SEP-2025 20:26:16.38 to 2-SEP-2025 20:41:30.77 (00:15:14.39)
878 buckets, buckets < 10000 bytes coalesced (threshold)

                High Points For Each Interval
Start Time      --Interval---  PkXmt  PkRcv  BytXmt  BytRcv  Mb/s
2-SEP-2025 20:31:33.38  1.00  1s  EIA0   53283  53127  41778668  41869964  669
2-SEP-2025 20:30:09.38  10.00 10s EIA0  493224 493240 386747508 388734846  620
2-SEP-2025 20:30:35.38  60.00 1m  EIA0  2862393 2862372 2244474690 2255906912  600
2-SEP-2025 20:26:18.38  600.00 10m EIA0 27856427 27856270 21842918k 21954221k  584
2-SEP-2025 20:26:16.38          914s EIA0 42355832 42355717 33212263k 33381597k  583
```

The following example shows the data for the previous 30 seconds:

```
$ MCR LANCP SHOW DEVICE EIA/BANDWIDTH/INPUT=BAND.DMP/LAST=0:00:30

VMS Device Bandwidth EIA0 (2-SEP-2025 21:00:34.99):
2-SEP-2025 20:41:02.62 to 2-SEP-2025 20:41:30.77 (00:00:28.14)
878 buckets, buckets < 10000 bytes coalesced (threshold)

                Duration      PkXmt  PkRcv  BytXmt  BytRcv  Mb/s  Code
2-SEP-2025 20:41:02.62 : 1.04 : EIA0 47078 47087 36913231 37109810 569 100Mb
2-SEP-2025 20:41:03.66 : 1.04 : EIA0 45806 45848 35918282 36136156 554 100Mb
2-SEP-2025 20:41:04.70 : 1.04 : EIA0 53617 53585 42041912 42231851 648 100Mb
2-SEP-2025 20:41:05.74 : 1.04 : EIA0 47127 47123 36955719 37138565 570 100Mb
2-SEP-2025 20:41:06.78 : 1.04 : EIA0 50217 50252 39374145 39604934 608 100Mb
2-SEP-2025 20:41:07.82 : 1.05 : EIA0 41943 41941 32890815 33054335 502 100Mb
2-SEP-2025 20:41:08.87 : 1.04 : EIA0 48832 48834 38290392 38486234 591 100Mb
2-SEP-2025 20:41:09.91 : 1.06 : EIA0 48826 48842 38283293 38495252 579 100Mb
2-SEP-2025 20:41:10.97 : 1.04 : EIA0 53795 53824 42183496 42420040 651 100Mb
2-SEP-2025 20:41:12.01 : 1.04 : EIA0 43048 42938 33754860 33838117 520 100Mb
2-SEP-2025 20:41:13.05 : 1.05 : EIA0 50686 50676 39744966 39940943 607 100Mb
2-SEP-2025 20:41:14.10 : 1.04 : EIA0 48012 48075 37647486 37887323 581 100Mb
2-SEP-2025 20:41:15.14 : 1.07 : EIA0 41587 41430 32609541 32654106 488 100Mb
2-SEP-2025 20:41:16.21 : 1.04 : EIA0 48867 48895 38316819 38535071 591 100Mb
2-SEP-2025 20:41:17.25 : 1.04 : EIA0 47474 47529 37224232 37456893 574 100Mb
2-SEP-2025 20:41:18.29 : 1.04 : EIA0 47724 47825 37423706 37692710 578 100Mb
2-SEP-2025 20:41:19.33 : 1.04 : EIA0 44751 44649 35090589 35190780 541 100Mb
2-SEP-2025 20:41:20.37 : 1.04 : EIA0 52123 52164 40870083 41110652 631 100Mb
2-SEP-2025 20:41:21.41 : 1.04 : EIA0 47909 47910 37567509 37757980 579 100Mb
2-SEP-2025 20:41:22.45 : 1.04 : EIA0 50148 50100 39320688 39487034 606 100Mb
2-SEP-2025 20:41:23.49 : 1.04 : EIA0 48522 48497 38048964 38221871 587 100Mb
2-SEP-2025 20:41:24.53 : 1.04 : EIA0 46977 47134 36835885 37147010 569 100Mb
2-SEP-2025 20:41:25.57 : 1.04 : EIA0 39295 38240 30812147 30137900 469 100Mb
2-SEP-2025 20:41:26.61 : 1.04 : EIA0 49921 50948 39144349 40153828 610 100Mb
2-SEP-2025 20:41:27.65 : 1.04 : EIA0 53779 53741 42168825 42354491 650 100Mb
2-SEP-2025 20:41:28.69 : 1.04 : EIA0 46636 46008 36569042 36257854 560 100Mb
2-SEP-2025 20:41:29.73 : 1.04 : EIA0 51943 52544 40727431 41411240 632 100Mb
```

Note that the dump time was 20:41:32.22 and the bandwidth data stopped at 20:41:30.77, so we can see the activity on EIA just before the crash.

## 5. Impact on Performance

Collecting this data involves 26–35 MACRO-32 instructions per second. It is very difficult to measure any performance impact due to the impossibility of replicating the exact environmental conditions. For example, any interrupt mitigation differences between tests overwhelms any measurement of the bandwidth monitoring overhead.

If you are concerned about the overhead, you can disable this function with the following command:

```
LANCP> SET DEVICE/NOBANDWIDTH/ALL
```

## 6. S2 Space Considerations

By default, the amount of S2 space available to the pool allocation routines is relatively small.

The maximum size bandwidth buffer is 7 MB per LAN device (using the LAN\_FLAGS system parameter), or approaching 1 GB per LAN device using the LANCP **SET DEVICE/BANDWIDTH** command. Increase the S2 size as needed.

```
$ RUN SYS$SYSTEM:SYSGEN.EXE
```

```
SYSGEN> SHOW NPAGE
```

Parameter Name	Current	Default	Min.	Max.	Unit	Dynamic
NPAGEDYN	99999744	4194304	163840	1879048192	Bytes	
NPAGEVIR	399998976	16777216	163840	1879048192	Bytes	
NPAGECALC	0	1	0	2	Coded-valu	
NPAGERAD	0	0	0	-1	Bytes	
<b>NPAGEDYN_S2</b>	<b>5</b>	<b>2</b>	<b>2</b>	<b>1024</b>	<b>Mbytes</b>	
<b>NPAGEXPVIR_S2</b>	<b>7</b>	<b>4</b>	<b>4</b>	<b>2048</b>	<b>Mbytes</b>	

The above example shows NPAGEXPVIR\_S2 currently at 7 Mbytes, which will need to be increased to support multiple NICs and bandwidth buffers larger than the default size.

Refer to the relevant section in the [VSI OpenVMS Performance Management Manual \[https://docs.vmssoftware.com/vsi-openvms-performance-management-manual/#NONPAGED\\_POOL\]](https://docs.vmssoftware.com/vsi-openvms-performance-management-manual/#NONPAGED_POOL) for general nonpaged pool recommendations and guidelines.

## 7. Further Data Analysis

To do your own analysis of the data, write a program to read the binary dump file. The dump file is a 32-byte header entry followed by a number of bandwidth entries:

The bandwidth header has the following structure:

```
+-----+
| Length of bw data (excluding header) | 0
+-----+
| Threshold value | 4
+-----+
| | 8
+-- Final entry time --+
| |
+-----+
| | 16
+-- Monitoring start time --+
```

+-----+	+-----+
	24
+-- Oldest entry time --+	--+
+-----+	+-----+

A bandwidth entry has the following structure:

+-----+	+-----+
	0
+-- Entry start time (EXE\$GQ_SYSTIME) --+	--+
+-----+	+-----+
	8
+-----+	+-----+
	12
+-----+	+-----+
	16
+-- Bytes sent --+	--+
+-----+	+-----+
	24
+-- Bytes received --+	--+
+-----+	+-----+