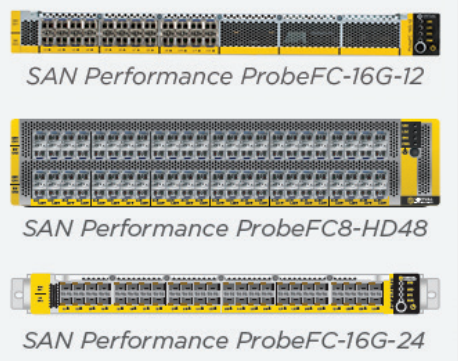
VIRTUAL INSTRUMENTS

DATASHEET

# VirtualWisdom® SAN Performance Probe Family Models: ProbeFC8-HD48, ProbeFC16-24 and ProbeFC-16G-12

## Industry's only Fibre Channel monitoring probes enable comprehensive Infrastructure Performance Management (IPM)




### VirtualWisdom Features

- Enhanced SLA management
- Enhanced metrics sets
- Automatic link assignment
- Summarization performed by probe
- New portal configuration

### Introduction

VirtualWisdom Performance Probes are the industry's first and only real-time, full line rate family of monitoring solutions for Fibre Channel storage area networks (SANs). Working completely out-of-band, the SAN Performance Probes analyze every Fibre Channel frame on monitored SAN ports, and report hundreds of metrics every second to provide comprehensive, accurate, and vendor agnostic monitoring at the protocol level. The Performance Probes are offered in 3 different bi-directional link densities; ProbeFC-16G-12, FC8-HD48 (48), and FC16-24 (24).

SAN Performance Probe metrics are correlated with those from other VirtualWisdom Probes, persistently stored, and presented by the VirtualWisdom Platform Appliance—providing holistic and timely insight into the health, utilization, and performance of large-scale, heterogeneous, open-systems based infrastructures.

VirtualWisdom's best-in-class capabilities for deriving definitive and actionable insights from these comprehensive metrics deliver tremendous value across the Infrastructure Performance Analytics domains:

- **Proactive Monitoring:** VirtualWisdom provides early identification of emergent performance, health, and utilization issues, enabling rapid implementation of corrective actions to improve performance and availability and reduce operational risk.
- **Deep Diagnostics:** Detailed, time-coherent data helps to identify the root causes of even the most sporadic and complex performance and availability issues, so they can be definitively resolved and prevented.
- **Infrastructure Optimization:** Comprehensive insights into the relationships between workload, performance, and utilization that supports the optimal alignment of application demands with infrastructure capabilities. This delivers the required performance at the lowest cost and highest availability.
- **SLA Management:** The ability to measure and generate detailed histogram reports on I/O performance for every single frame facilitates the implementation of true performance-based SLAs, enabling tighter and more transparent alignment between infrastructure, application, and line of business groups.

## What VirtualWisdom Offers

- **Enhanced SLA Management:** The performance probes enable the creation of detailed histogram reports that provide real-time performance I/O workload distribution statistics for every single exchange. These innovative histogram charts allow the user to quickly demonstrate compliance with performance-based SLAs for every single transaction.
- **Enhanced Performance Management Metrics:** SAN Performance Probes introduce a set of new metrics in VirtualWisdom that help users quickly identify and resolve performance problems. For example, “Write Host and Arrayside Delay” —tells the user how much of the system-wide latency was attributed to waiting on the “transmission ready” acknowledgement (TxRdy) from the host versus the write latency introduced by the Array.
- **Automatic Link Association:** SAN Performance Probes observe ITL conversations and attempts to automatically place the device and switch links based on the observed conversations. This dramatically streamlines the install and configuration process and reduces the time-to-value.
- **One-Minute Summarization on Probe:** The SAN Performance Probe firmware allows the probe itself to calculate detailed one-minute summaries of all the performance probe metrics before sending them to the VirtualWisdom Platform Appliance for storage and presentation. Summarizing the metrics on the probe drastically improves the Platform Appliance scalability and reduces the network latency requirements—without losing the detail in the summary.
- **Portal assignment model:** The new Portal Assignment model improves configuration flexibility by allowing a SAN Performance Probe to be monitored by multiple VirtualWisdom Platform Appliances.

### Product Features

- Real-time, full line rate FC SAN traffic monitoring of up to 48 concurrent SAN ports
- Detailed I/O performance, health, and utilization measurements
- Transmission, protocol, and fabric error detection
- Port and resource utilization and congestion reporting
- Buffer credit starvation and slow-draining device detection
- Out-of-band, vendor-agnostic operation
- Field-reversible airflow and replaceable cooling fans
- Hot-swappable redundant power supply modules
- Remote administration (includes firmware maintenance, configuration and monitoring)

- **Hardware Investment Protection:** All the VirtuaWisdom SAN Performance Probe enhancements are available to existing probes by applying the latest firmware. This ensures that customers will not be required to replace their existing SAN Performance Probes in order to take advantage of VirtualWisdom enhancements.

## Deployment and Security

The SAN Performance Probes are typically deployed on the links between storage ports and next-tier switches, or on both sides of fabric-based storage virtualizers. Connectivity to the live links is provided by traffic access points (TAPs), which use passive optical couplers to access the optical signal on both channels of the link. A TAP diverts a small amount of the optical power on each channel to a full line rate monitoring output for out-of-band access by the SAN Performance Probes. TAPs certified for compatibility with the SAN Performance Probes are available from both Virtual Instruments and a growing number of leading physical infrastructure providers. The SAN Performance Probe has no data payload out of the FPGA accessible memory. The SAN Performance Probe removes all data from the signal and processes only the frame headers themselves, so the VirtualWisdom server and its repository never see the data payload. Only traffic metrics are communicated from the SAN/NAS Performance Probe to the VirtualWisdom Server.

## Monitoring and Metrics

Connected to the TAP monitor ports, the SAN Performance Probes analyze all received traffic at the full duplex 8Gb and 16Gb line rates. They report on hundreds of metrics per second per port, with details at link, channel, and initiator-target-LUN levels. This set of high frequency, highly detailed metrics includes the following:

- **Calculated Metrics:** SAN Performance Probes capture hundreds of unique, real-time metrics. VirtualWisdom then calculates additional metrics by correlating those with other data, giving users greater insight into the performance of their infrastructure. These calculated metrics are developed by leveraging decades of Virtual Instruments' knowledge and expertise in infrastructure performance. For example, the "Queue Busy percentage" represents the time spent with any number of pending exchanges over a sampling period. This helps the user quickly understand if their queue depth settings are impacting overall system performance.
- **Health:** Metrics including CRCs and other frame errors, loss of signal or synchronization, logins and logouts, SCS check conditions, discards, and aborts are all monitored to identify transmission, exchange, or fabric-level errors and trends
- **Utilization:** The amount and type of traffic on each channel is monitored, providing direct observation of channel and port-level utilizations and the fabric operating state. Metrics can be flexibly aggregated by VirtualWisdom to monitor the utilization of backplanes, control processors, and other critical device resources.
- **Performance:** The SAN Performance Probes monitor the performance of every SCSI exchange between each unique combination of initiator port, target port, and LUN (ITL), calculating metrics by exchange type including completion time, time to first response, and size. As with other VirtualWisdom metrics, these performance measurements can be flexibly aggregated by entity to enable monitoring of total I/O workload, type of I/O, and performance by business application, application tier, storage tier, or other logical grouping.

## Specifications

### Connectivity

- **SAN Link Interface:** Connectivity to the TAP monitor outputs is provided via field-replaceable small form factor pluggable plus (SFP+) optical transceivers.
- **SAN Link Capacity:** The ProbeFC8 family of SAN Performance Probes come in 48 concurrent Fiber Channel SAN Links operating at 2/4/8 Gbps speeds, while the ProbeFC16 SAN Performance Probes monitor up to 12 and 24 concurrent Fiber Channel SAN Links operating at 4/8/16 Gbps speeds.
- **VirtualWisdom Platform Connectivity:** The SAN Performance Probes connect to the VirtualWisdom Platform Appliance via Gigabit Ethernet to transfer calculated SAN metrics for persistent storage, analysis, and display.

### Deployment and Serviceability

- True appliance without physical or remote console access. Firmware maintenance, device configuration, and operational monitoring are all performed remotely via VirtualWisdom.
- Initial configuration and ongoing management are performed through a standard browser interface via a dedicated and directly connected ethernet port (not a networked port).
- Redundant hot-swappable power supply modules for high availability.
- Field-replaceable and reversible cooling fan modules support both front-to-rear and rear-to-front airflow.

### Safety and Emissions Compliance

- **Emissions**
  - United States: FCC Part 15, Subpart B
  - (Class A Device)
  - Canada: ICES
  - Europe: EN 55022
  - Korean: KN 22
- **Safety**
  - UL/EN/IEC 60950-1
  - Restriction of Hazardous Substances (RoHS)

### Environmental

- **Temperature**
  - Operating: +10 to +35° C (50° to +95° F), max gradation 10° per hour
  - Non-Operating: -20 to +80°C, (-4° F to 176° F) max gradation 20°C per hour
- **Humidity**
  - Operating: 20% to 80% non-condensing, max gradation 20% per hour
  - Non-Operating: 5% to 95% non-condensing, max gradation 20% per hour

## Mechanical

| | ProbeFC8-HD48 | ProbeFC-16G-24 | ProbeFC-16G-12 |
|---|---|---|---|
| |  |  |  |
| **Height** | 2U, 3.5 in (8.9 cm) | 1U, 1.75 in (4.45 cm) | 1.75 in. / 4.45 cm. (1U) |
| **Width** | 17.2 in. (43.7 cm) | 17.2 in. (43.7 cm) | 17.2 in. / 43.7 cm. |
| **Depth** | • 28.2 in. (71.6 cm).<br>• Front face projects maximum 0.5 in (1.3 cm) from rack rails.<br>• Maximum fixed projection from front face 0.75 in (1.9 cm), from rear face 1.0 in (2.5 cm).<br>• Optional cable manager projects 4.5 in (11.4 cm) from front face. | • 28.2 in. (71.6 cm).<br>• Front face projects maximum 0.5 in (1.3 cm) from rack rails.<br>• Maximum fixed projection from front face 0.75 in (1.9 cm), from rear face 1.0 in (2.5 cm).<br>• Optional cable manager projects 4.5 in (11.4 cm) from front face. | • Front face projects maximum 0.5 in (1.3 cm) from rack rails.<br>• Maximum fixed projection from front face 0.75 in (1.9 cm), from rear face 1.0 in (2.5 cm).<br>• Optional cable manager projects 4.5 in (11.4 cm) from front face |
| **Minimum Cable Bend Radius Allowance** | 4.5 in (11.4 cm) front and 3.5 in (8.9 cm) rear | | |
| **Weight** | 52 lbs. (23.6 kg) including rack rails and cable management system | 35 lbs. (15.9 kg) including rack rails and cable management system | including rack rails and cable management system |
| **Rack Mounting** | Sliding rack rails support 4 post racks with square, round, or tapped holes with rail-to-rail depths of 26.5 in (67.31 cm) to 36 in (91.4 cm.) 1U, 25 in (61 cm) deep shelf kit available for alternate rack deployments. | | The including sliding rails support mounting a ProbeFC-16G-12 in a 4-post rack with square, round, or threaded holes and rail depths from 26.5 in. to 36 in. Accessories to support alternate rack configurations are available from Virtual Instruments. |

## Electrical

| | ProbeFC8-HD48 | ProbeFC-16G-24 | ProbeFC-16G-12 |
|---|---|---|---|
| **Input Voltage** | 100-240V | 100-240V | 100-240V |
| **Input Frequency** | 50/60 H | 50/60 H | 50/60 Hz |
| **Current Rating** | 7–3 A | 5.4 A @ 115VAC,<br>2.7 A @ 230VAC | 5.4A at 115VAC<br>2.7A at 230VAC |
| **Inrush Current** | 60/80 A @ 115/230V<br>(25° C) | 15/30A @ 115/230V<br>(25° C) | 15/30A @ 115/230V<br>(25° C) |
| **Typical Operating Power** | 750W (max.) | 622W (max.) | 310W |

VIRTUAL INSTRUMENTS

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