Data Sheet

Key Challenges Addressed

VirtualWisdom optimizes the performance, availability, and cost of mission-critical application infrastructure across data center, private- and hybrid-cloud compute, network, and storage infrastructure.

VirtualWisdom Performance Probes are hardware tools that provide the highest resolution insights into the operation and performance of Fibre Channel SAN environments.

The combination of VirtualWisdom with our Fibre Channel SAN Performance Probes yields millisecond-level high-fidelity storage port data with full-stack views of applications and market-leading analytics. This enables you to:

- **Speed problem resolution** with AI-powered recommendations that identify solutions even as alarms are raised
- **Ensure resource availability** with AI-driven predictive capacity management from port to LUN, VM, host, or full application infrastructure sets (including cloud environments)
- **Automate storage and other application infrastructure resource optimization** for cost, performance, and risk with AI, ML, and statistical-driven recommendations

Hardware Probes Enable High Fidelity Monitoring

- Storage arrays in your SAN can collect statistics, but they cannot monitor over a per-second granularity. Doing so would impact their primary function, which is to provide on-demand storage capacity to applications. Offloading the monitoring function to a dedicated appliance allows the storage array to stay focused on its primary function – serving data.
- An event that occurs for a few milliseconds but impacts the SLA of your business-critical application would be lost to software monitoring solutions as they rely on sampling.
- As VirtualWisdom Performance Probes operate at the protocol level, the solution is agnostic to the storage or SAN vendor. This enables a consistent single-pane-of-glass view across multi-vendor SAN and storage to identify root cause of infrastructure issues impacting your application SLA.

VirtualWisdom Fibre Channel SAN Performance Probe

- Monitor every application conversation from the initiator to the target LUN
  - Up to 24 ports of 4/8/16/32G Fibre Channel in a 1U chassis appliance, reporting at 1 sec. resolution.
  - Benefit from histograms that provide sub-second visibility into application conversations with metrics for R/W latency including Exchange Completion Time (ECT), R/W ratios, and R/W I/O size.
  - Identify credit starvation by tracking buffer credits and the number of unacknowledged frames that can be in flight between a source and destination.
  - Rapidly find low level physical layer errors as well as higher level SCSI ones.
• Identify delays at the host and storage level
  ‒ Leverage over 400 metrics gathered and summarized at 1 sec., 10 sec., and 1 min.
    intervals.
  ‒ An application conversation is a discrete communication between an initiator (host),
    the target (storage port) and the LUN being accessed. VirtualWisdom tracks every
    conversation by taking 31 measurements per conversation per second.
  ‒ A single Performance Probe can monitor 19,200 unique ITLs per second.
• Get to root cause on issues that occur for only a few seconds with ML-based analytics that proactively
  optimize storage to prevent problems before they affect applications that depend SAN environments
  ‒ **Queue Solver** troubleshoots flow control issues and enables you to understand the impact of I/O
    queue depths across hosts. Queue depth refers to the number of I/O requests (SCSI commands) that
    can be queued at one time.
  ‒ **Storage Port Balancer** enables improved application performance by optimizing the
    storage ports’ load on your Fibre Channel SAN.
  ‒ **Trend Matcher** gets to root cause of problems created by an entity that is several hops away
    from the alarm location. Machine Learning assists in cross domain correlation and actionable
    recommendations as the traffic flow between entities could comprise thousands of micro
    transactions per second that converge and diverge at different nodes.
  ‒ Deployed with passive TAPs that ensure every I/O is monitored with zero performance impact on
    the infrastructure.

**Connectivity**
• **SAN Link Interface:** Connectivity to the TAP monitor outputs is provided by field-replaceable small form
  factor pluggable plus (SFP+) optical transceivers.
• **SAN Link Capacity:** ProbeFC-32G SAN Performance Probe monitors up to 24 concurrent Fibre Channel
  SAN links operating at 4/8/16/32 Gbps speeds.
• **VirtualWisdom Platform Connectivity:** SAN Performance Probes connect to the VirtualWisdom
  Platform Appliance and transfer calculated SAN metrics for persistent storage, analysis, and display.

**Deployment and Serviceability**
• Performance probes are deployed completely Out of Band from the primary data stream. The only In-band
  device is the non-powered optical TAP Patch Panel, meaning zero production impact introduced by the
  hardware probe.
• No physical or remote console access is required. 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 (directly connected) Ethernet port that is not network accessible.
• Redundant hot-swappable power supply modules provide high availability.
• Field-replaceable and reversible cooling fan modules support both front-to-rear and rear-to-front airflow.
## Safety and Emissions Compliance

### Safety
- UL/EN/IEC 60950-1
- Restriction of Hazardous Substances (RoHS)

### Emissions
- United States: FCC Part 15, Subpart B (Class A Device)
- Canada: ICES
- Europe: EN 55022
- Korean: KN 22

## Environmental

### Temperature
- Operating: +10°C to +35°C (50°F to +95°F), max. gradation 10°C per hour
- Non-Operating: -20°C 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

<table>
<thead>
<tr>
<th>Mechanical</th>
<th>ProbeFC-16G-12</th>
<th>ProbeFC-16G-24</th>
<th>ProbeFC-32G-24</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Height</strong></td>
<td>1U, 1.75 in (4.45 cm)</td>
<td>1U, 1.75 in (4.45 cm)</td>
<td>1U, 1.75 in (4.45 cm)</td>
</tr>
<tr>
<td><strong>Width</strong></td>
<td>17.2 in (43.7 cm)</td>
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<td>17.2 in (43.7 cm)</td>
</tr>
</tbody>
</table>
| **Depth**        | • 28.2 in (71.6 cm)  
                  |   • Maximum fixed projection from front face 0.75 in (1.9 cm), from rear face 1.0 in (2.5 cm)  
                  |   • Optional cable manager projects 4.5 in (11.4 cm) from front face  
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                  |   • Optional cable manager projects 4.5 in (11.4 cm) from front face  |
| **Weight**       | 42 lb (19 kg) including rack rails and cable management system  
                  | 35 lb (15.9 kg) including rack rails and cable management system  
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| **Rack Mounting**| The included sliding rails support 4-post rack mounting with square, round or threaded holes and rail depths from 26.5 in (67.31 cm) to 36 in (91.4 cm). A 1U, 25 in (61 cm) deep shelf kit available for alternate rack deployments.  
                  | The included sliding rails support 4-post rack mounting with square, round or threaded holes and rail depths from 26.5 in (67.31 cm) to 36 in (91.4 cm). Accessories for alternate rack deployments are available.  
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