

SANInsight™ Fiber TAP Patch Panel System

10G Fiber Patch Panels with Integrated Traffic Access Points (TAPs)

Rapid increases in both the operating speeds and general complexity of SAN technologies, exacerbated by the high change rates demanded of enterprise IT organizations, significantly increase demands on the fiber optic physical layer.



- Immediate access to all network traffic without downtime or disruption to live environment
- Enables dynamic connection of analysis, monitoring, and security devices into fiber optic networks
- Accelerates SAN problem identification and resolution
- Empowers real-time optimization of SAN performance and utilization
- Provides real-time, bit-for-bit copy of all traffic, unlike switch mirror or SPAN ports

The Challenge: Optimizing SAN Performance, Availability & Utilization

A best practices-compliant physical layer must be capable of being both *maintained* and *monitored* in order to meet those demands. Physical layer maintenance requires the ability to quickly and easily add, change, or remove links and devices. Physical layer monitoring is the real-time acquisition of error, performance, and utilization data via Traffic Access Points, or TAPs. Monitoring ensures the accuracy of the changes and validates that they produce only the desired results. Physical layers that address both requirements enable the Fiber Channel SANs operating on top of them to be iteratively optimized for maximum availability, performance, and utilization.

Fiber optic cable plants make broad use of patch panels, which simplify changing device connections to pre-installed cabling, to improve maintainability. But while the tremendous value of passive, out-of-band monitoring is increasingly recognized, the deployment of the enabling TAPs has not yet reached the same level of ubiquity, due at least in part to the low fiber density and limited configurations of pre-existing TAP solutions.

All too often, TAP installation is only undertaken on a retrofit basis to help troubleshoot active problems in production environments. This is a highly inefficient approach, as no matter how critical the problems, TAP installation will require downtime or will have to wait for the next scheduled maintenance window

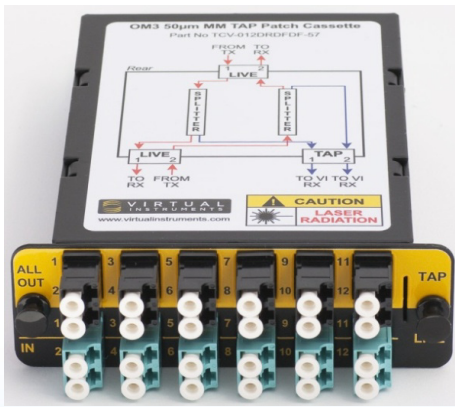
Further, as Tapping is typically undertaken only for those links impacted by the current issue, it does little to help either prevent future issues or speed their resolution.

The Solution: SANInsight TAP Patch Panel System

Virtual Instrument's new SANInsight TAP Patch Panel System provides a range of options for integrating the unique, patented technology of our TAPs into patch panels from both Virtual Instruments and other leading vendors.

By unifying TAPs and patch functions into a single layer of physical infrastructure, SANInsight significantly reduces the cost, complexity, and infrastructure impact of TAP deployment. SANInsight facilitates the broad installation of TAPs into both new and existing physical infrastructures, fully addressing the best practices monitorability requirement and enabling complete SAN optimization.

Figure 1: SANInsight 6 link TAP Patch Cassette



Solution Components

The TAP Patch Panel System incorporates TAPs into TAP Patch Cassettes that are installed into rack-mounted Patch Shelves. Each of these components is detailed below.

Traffic Access Point (TAP)

A TAP uses a passive (unpowered) fiber optic splitter to create an exact copy of the light signal passing through it. The fiber carrying the signal from a device's transmit port is connected to the splitter input; the splitter's live output is connected to the receive port of the downstream device, while a second output carries the copy of the live signal for out-of-band access. A TAP uses two of these splitters, installed on the two fibers supporting both channels of a duplex Fiber Channel link, to create a complete copy of all traffic between the two devices.

The ratio at which the splitter divides the incoming light signal between the two outputs is called the "split ratio". Virtual Instrument's standard splitters use a 70/30 ratio – 70% of the incoming light goes to the live output, 30% to the TAP output. Keeping such a high portion of the light on the live output is critically important, given the tight light budgets imposed by high Fiber Channel line rates. Apart from the attenuation that results from dividing the light signal, the splitter introduces no latency or other alteration to the signal. Its behavior remains constant whether or not a receiving device is connected to the

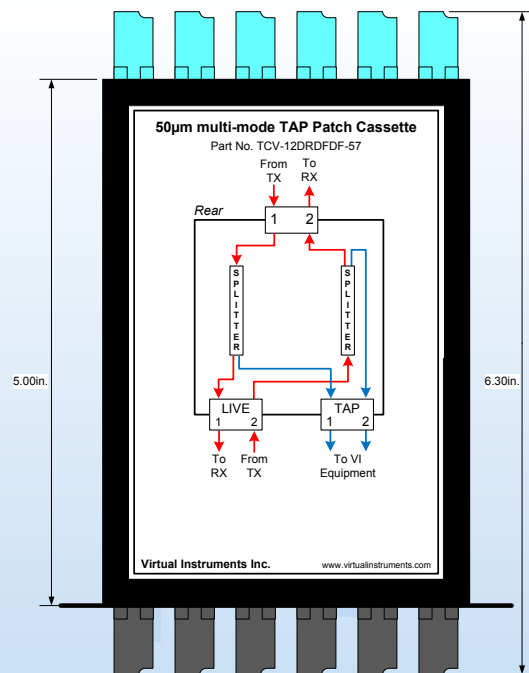
TAP output, making the TAP a true "install and forget" physical layer component.

While the optical splitter is simple in concept, in practice there are significant technical challenges to creating a jitter-free and fully-readable TAP output, especially when combining asymmetrical split ratios and high line speeds. Virtual Instrument's TAPs use patented technology to address these challenges and are certified to provide a fully readable signal copy up to a 10 Gb/s line rate. Our TAP technology is demonstrably superior to products that use a symmetrical 50/50 split ratio, which may attenuate the live signal to unworkably low levels, or that have not addressed the jitter issue and will not produce a readable TAP output at higher line rates.

TAP Patch Cassette

The TAP Patch Cassette houses the TAPs and provides standard fiber optic adapters for connecting the trunk, patch, and TAP cabling. The dimensions of the standard VI TAP Patch Cassette body (an example is shown in Figure 2) allow it to mount in both VI's TAP Patch Shelves and Panduit's OptiCom® QuickNet™ enclosures. TAP Patch Cassettes with dimensions compatible with other patch enclosures or shelves are available by special order

Figure 2: Top Diagram View of Example VI TAP Patch Cassette



The VI TAP Patch Cassette is available in four standard configurations with varying fiber densities and mixes of LC and MT trunk, patch, and TAP connections on the front and rear panels. These configurations, shown in detail in Figure 3, are as follows:

- 8 live fibers/4 duplex links; front duplex LC adapters for trunk, patch, and TAP connections. Part # TCV-008DFDFDF-XY.

- 12 live fibers/6 duplex links; rear duplex LC adapters for trunk connections; front duplex LC adapters for patch and TAP connections. Part # TCV-012DRDFDF-XY.
- 12 live fibers/6 duplex links; rear MT adapters for trunk connections; front duplex LC adapters for patch and TAP connections. Part # TCV-012MRDFDF-XY.
- 24 live fibers/12 duplex links; rear MT adapters for trunk and TAP connections; front duplex LC adapters for patch connections. Part # TCV-024MRDFMR-XY.

Each of these configurations is available in several fiber types and split ratios; these are specified in the X and Y characters of the part numbers, respectively, as follows:

- X= 5 for OM3 50µm laser-optimized multi-mode fiber; 6 for 62.5µm multi-mode fiber, and 9 for 9µm single-mode fiber.
- Y=7 for 70/30 split ratio and 5 for 50/50 split ratio.

Additional fiber density and adapter configurations of the VI TAP Patch Cassette, as well as VI MT-to-LC Cassettes without TAPs and MT-MT and LC-LC adapter plates, are available by special order.

TAP Patch Shelves

The SANInsight TAP Patch Panel System includes two 1U shelves, each mounting up to 4 TAP Patch Cassettes:

- TPS-01ES is a fully-enclosed patch shelf with an inner tray that slides to both front and rear to simplify installation.
- TPS-01OB is a fixed shelf with an open back.

Both shelves are for EIA standard 19" racks (adapter ears for 23" racks are available separately) and are 14" deep, with multiple cable tie-downs and embosses for included rings for secure and serviceable and cable management. TPS-01ES also has multiple cable entry knockouts on the sides and rear, and uses screwed-on plates to secure the entry grommets to prevent accidental dislodging and potential abrasion damage to the cables.

TAP Patch Panel Installation Locations

TAPs are typically installed on the storage links (between the core switches and storage devices), as these are far fewer in number than the server links and still provide full access to all Fiber Channel traffic. There are three potential locations for installing TAP Patch Panels along the storage links:

1. In place of patch-only panels at the core switches;
2. In place of patch-only panels at the storage edge;

3. As an additive layer between the storage edge patch panel and storage devices (or between the storage edge trunk cabling and devices, if directly cabled).

Note that the patch panels in the first two options may be proximate to the switches and storage devices, or may be centrally located with trunk cabling run directly to the device ports.

While the first two deployment options are typically feasible only in new installation or large-scale equipment refresh scenarios, they are strongly preferred as they avoid introducing an extra cable hop into the live data path. Locating the TAP Patch Panels at the core switch links – Option #1 – is preferred, as it enables installing TAPs onto the intra-switch links (ISLs), as well as onto the storage links. While the Virtual Instruments SAN Performance Probe has a limited ability to monitor ISLs, the Virtual Instruments Protocol Analyzer (and those of other vendors) can effectively trace traffic across aggregated ISLs. TAPs on ISLs can be therefore very valuable for diagnostics – and very difficult or impossible to retrofit into live environments, making it important to deploy them during physical layer installation.

Option #3 above is the least preferred, as it inserts an additional cable hop with attendant insertion loss, material and installation cost, and rack space requirements into the live data path. This may, however, be the only viable option for retrofitting TAPs into live environments, as the live links can be reconnected through the TAP Patch Panel a single link at a time, minimizing disruption.

Component Selection Considerations

TAP Patch Cassette selection is driven by the existing or planned trunk cabling and rack access requirements in the target installation locations, as follows:

- **If trunk cabling is MT terminated**, select the TCV-012MRDFDF-XY Cassette.
- **If trunk cabling is LC terminated**, the TCV-012DRDFDF-XY Cassette provides the highest available density by connecting the trunk cabling to the rear of the Cassette. If the rear of the Cassette cannot be accessed – when retrofitting into existing patch links, for example – then the TCV-008DFDFDF-XY, which has all front-mounted adapters, is the correct Cassette.

The TCV-012 series Cassettes can be mounted in either the PTS-01ES or PTS-01OB shelves. Choose the former if you have significant cable lengths that you want to manage in the shelf, or the latter if cable management is in the rack itself (or MT cabling is pre-terminated to the exact required lengths) and you need only to mount the Cassettes and secure the trunk cables. The PTS-01OB is the best shelf choice for the TCV-08 series Cassettes.

Features

Allows passive, out-of-band monitoring of all Fiber Channel traffic

Adds no latency and does not alter live traffic

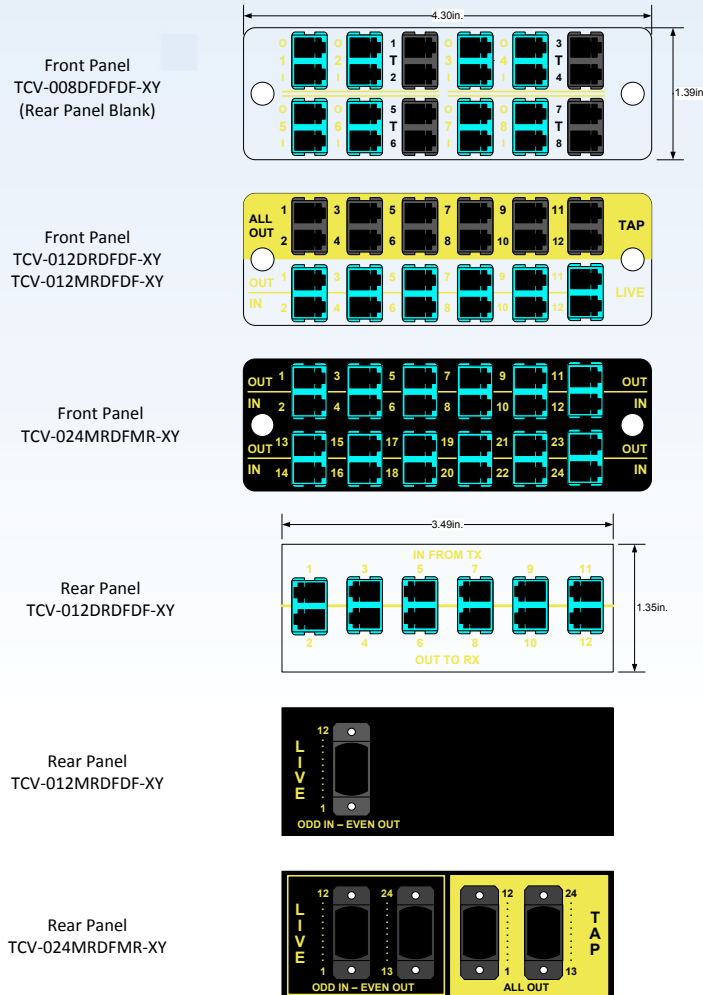
High density: 4-12 TAPs per cartridge; a total of up to 48 tapped patch links in 1U of rack space

Standard 70/30 light split minimizes attenuation of live signal

Supports LC or MT connectors for flexibility in SAN connectivity

Optimized, low-loss LC and MT adapters; industry standard color coding for all trunk and patch adapters

Figure 3: TAP Patch Cassette Configurations — Front and Rear Panels



Corporate Headquarters
25 Metro Drive Suite 400
San Jose, CA 95110
Phone: 408-579-4000
Fax: 408-579-4001

Sales
sales@virtualinstruments.com
Phone: 408-579-4081

Support
support@virtualinstruments.com