



High-Density Network Taps

Features...

- Offers low-insertion loss with flexible tap ratios
- Provides flexible tap configurations using LC/SC/MPO (MTP) adapters
- 1xn taps are available (n=2/3/4/8)
- Acquires all data non-intrusively for monitoring
- Eliminates the possibility of losing traffic due to backplane congestion on L2/3 SPAN ports
- Enables application flexibility with removable modules

Benefits...

- Provides a true pay-as-you-grow model
- Reduces space while increasing capacity – highest available
- Increases monitoring flexibility for LGX with various tap combinations
- Mirrors traffic without impacting performance
- Prevents “blind” spots from occurring when monitoring
- Allows for expansion to accommodate more taps or

Monitor More with Less

Using maXtap™’s network tap modules allow network operators to non-intrusively monitor more traffic in the smallest LGX footprint available. Traditionally, L2/3 switch routers use Switched Port ANalyzer (SPAN) ports to monitor traffic. When a malicious cyberattack occurs such as a Distributed Denial of Service (DDoS) attack, congestion occurs on the L2/3 devices backplane. When congestion is encountered the L2/3 device frequently reacts by dropping all SPAN port traffic leaving you “blind” with no accessible visibility into the attack. One of the best and least expensive ways to guarantee this does not happen is to use a passive optical network tap, such as the maXtap™ LGX to increase network visibility and eliminate critical packet loss.

Flexibility to Meet Your Needs

Taps can be ordered with power split ratios of 50:50 up to 99:1 (50:25:25 or 60:20:20 for 1x3 taps). 1x2 50:50 taps split the optical signal symmetrically while 1x3 taps are asymmetric with 50/60% of the light passing through to the network and 25/20% to the monitoring devices. In addition, our tap modules can be configured for unidirectional or bidirectional taps. So, you can tap up to 192 fibers carrying 1/10/40/100+Gbps single mode fiber traffic in a single chassis.

For 40/100G bidirectional multimode fiber taps, we can provide two 40G or one 100G tap per module using MTP-24s for a total of 32/16.

** see next page for more information regarding module capacity*



OptiX² Standard High Density LGX Panels & Cassettes

The OptiX² LGX 1U Universal Panels offer flexibility and simplicity. The panels are designed for 19" racks and can accommodate all of OptiX²'s HX cassette-housed passive optical modules such as maXimux[®], OmniPON[™], maXpatch[™], and maXtap[™].

Table 1: LGX Cassette and Panel Mounting Options



12 LC simplex port LGX cassette with 2 MPO/MTP-12 adapters available for the rear of the module. Capable of housing dual duplex tap modules as well as multiple multiplexer configurations.



12 duplex LC port LGX cassette with 2 MPO/MTP-12 adapters available for the rear of the module. Other configurations available for SC and MPO/MTP adapters. Capable of housing quad duplex tap modules as well as multiple multiplexer configurations.



3 position standard LGX universal 19" rack mount panel for use with all OptiX² LGX single-width or high-density cassettes. Shown with optional rear cable management bar.



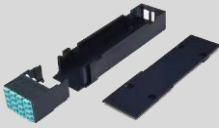


4 position High-Density LGX universal 19" rack mount panel for use with all OptiX² LGX single-width or high-density cassettes. Shown with optional rear cable management bar.



OptiX² Maximum Density 1U Cassettes and Chassis

The OptiX2 MX 1U Universal Panels offer flexibility and simplicity. The panels are designed for 19" racks and can accommodate all of OptiX2's MX cassette-housed passive optical modules such as maXimux[®], OmniPON[™], maXpatch[™], and maXtap[™].

Table 2: Maximum Density Cassette and Chassis

	16 LC simplex port MX cassette with 2 MPO/MTP-12 adapters available for the rear of the module. Capable of housing 8 duplex or 16 simplex tap modules. Removable adapter head accommodates multiple adapter configurations.
	16 slot chassis with rear opening to accommodate MPO/MTP trunk cables. Modules are securely fastened via the back panel and module guides.
	16 slot standard MX universal 19" rack mount panel for use with all OptiX2 HX cassettes.



maXtap™ Coupler/Splitter Technical Specifications

PARAMETER	SPECIFICATION		
Operating Wavelength (nm)	Dual window (1310/1550nm for SMF and 850/1300nm for MMF)		
Type	1x2 (add 0.3dB for MMF)	1x3 (add 0.5dB for MMF)	2x2 (add 0.5dB for MMF)
Insertion Loss (dB) Max.*	≤3.6 ¹ or ≤2.1 / ≤6.3 ¹ @ 70:30 ²	≤3.7 ¹ or ≤.7 ¹ / 7.6 ¹ @ 50:25:25 ²	≤3.8 ¹ / ≤4.8 ¹
Uniformity (dB) Max.*	≤0.6 / ≤0.8	≤0.8 / ≤1.0	≤0.6 / ≤0.8
PDL (dB) Max.*	≤0.2 / ≤0.4	≤0.2 / ≤0.4	≤0.2 / ≤0.4
Directivity (dB) Min*	55		
Return Loss (dB) Max*	55 APC / 50 UPC		
Operating Temperature (°C)	-40~+85		
Storage Temperature (°C)	-40~+85		
Fiber Length	1m or custom length		
Fiber Type	Corning SMF-28e Fiber / OM2-50 MMF (OM3/4/5 may deviate by +/-)		
Connector Type	Customer Specified		
Power Handling (mW)	300		

¹Includes LC connector loss. Add 0.2dB additional loss for MPO/MTP connectors.

²Contact sales for other split ratios such as 80:20 or 90:10.



Ordering Guide for maXtap™ Modules

BRAND	MODEL	FIBER	SPLIT	QTY	POWER RATIO	FRONT	REAR
OPTX-	MXT-NX	XN-	XX	XX	XX	X	X
	MX=Max Density	Multimode=MN	1x2=12	1=01	95:5=95 ¹	LCA=C	0=I/O same
		N=M3,M4,M5 (OM3/4/5)	1x3=13	2=02	90:10=90 ¹	LCU=D	LCA=C
	HX=High Density	Single mode=S	1x4=14	3=03	80:20=80 ¹	SCA=E**	LCU=D
	LX=Std		1x8=18	4=04	70:30=70 ¹	SCU=F**	SCA=E**
			2x2=22	8=08	60:40=60 ¹	MTP=M	SCU=F**
				10=10	Even=50 ¹	Other=X	MTP=M
				12=12	50:25:25=52 ¹		Other=X
				16=16	60:20:20=62 ¹		
				20=20			
				24=24			

Note: If 1x3s are used then the power ratio refers to the network and monitor sides. The monitor side will divide the remaining power equally. For example, a 52 would be 50:25:25 and a 62 would be 60:20:20. For 2x2s, the same value that is used for 1x2s can be used.

¹means option is only available for 1x3.

Example Order

An example of an order for a quad tap standard density module for single mode fiber with a 70:30 power split ratio and LC UPC Network Input/Output adapters is as follows: **OPTX-MXT-HX-S-120870D0**. Our High-Density module is slightly more narrow than the standard module to allow for 4 modules in a single to be housed in a single 1U, 4 slot faceplate. The high density module can be ordered with the following part number: **OPTX-MXT-HX-S-120870D0**. To order the faceplates, please use one of the following part numbers: **OPTX-LX-3-FP-01** for the 3 position 1U faceplate and **OPTX-LX-4-FP-01**. When ordering our proprietary Max Density module and chassis, please use the following part numbers: **OPTX-MXT-MX-S-120470D0** as an example for a module consisting of 4 1x2s with a 70:30 power ratio and LCU on both the Input and Output ports; and **OPTX-MX-16-UC-19** for the chassis.



Networking Monitoring with maXtap™

Network Monitoring – Today’s networks are under constant threat of attack. Cyberattacks have become an all too common occurrence. Whether the monitoring entity is looking for Distributed Denial of Service (DDoS) or other attacks, it is imperative that they receive an exact replica of the data on the network. Typical switches and routers usually have Switched Port Analyzer (SPAN) ports; however, they are generally ill-equipped for this function. For example, a DDoS attack is designed to flood a device with traffic coming from seemingly multiple sources until the device experiences so much traffic congestion that it fails. Unfortunately, most SPAN ports are designed to stop forwarding traffic when the backplane becomes congested. So, at the very moment the SPAN port is most needed it isn’t even functioning.

Even newer switches that claim to provide line rate monitoring with no packet loss and bypass switch functionality, can cause issues. Putting such active devices (devices that require power) on the backbone of a network increases the potential for network outages, interoperability issues, and higher network costs.

On the other hand, optical taps, which operate solely at the physical layer, collect all traffic no matter how congested the network gets and are completely passive (requires no power), which makes them ideal for collecting malicious traffic. In the example below, the maXtap™ is shown tapping a backbone fiber. An exact copy of the traffic is forwarded to an aggregation/filter switch, which filters out the unwanted packet types and aggregates the packets that need further examination. Then, these packets are sent to a data scrubbing server where possible threats can be analyzed.

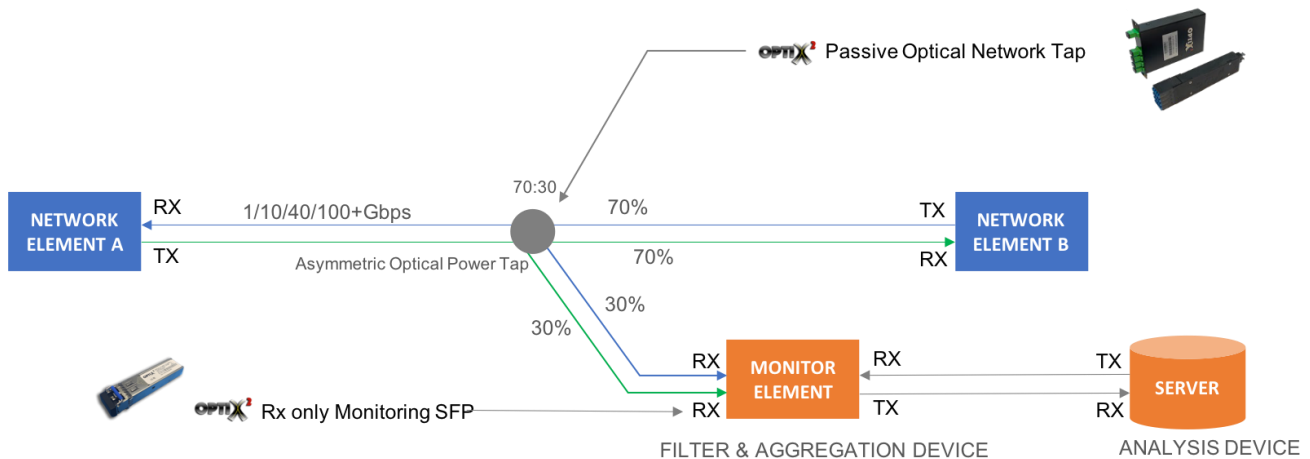


Figure 1: maXtap™ Network Architecture