

FOCUS

Investment Banking

Telecom Technology and Services Group

Carrier-Focused Telecom Technology Quarterly



Investment Banking and Advisory Services

FOCUS Investment Banking LLC is a leading investment bank with specialized telecom technology and services expertise, concentrating on providing highly tailored services to emerging middle market and larger organizations in this sector:

- Mergers & Acquisition Advisory
- Corporate Development Consulting
- Strategic Partnering & Alliances
- Capital Financing, Debt & Equity
- Corporate Valuations

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Carrier-Focused Telecom Technology Quarterly

By Richard Pierce, FOCUS Managing Director and Telecom Technology and Services Team Leader

FOCUS believes that the Carrier-Focused Telecom Technology sector is one of the most important in Telecom. As communications service providers struggle to keep up with ever increasing demand from their data hungry customers, they are turning to their technology partners to help them satisfy these needs in a cost-effective way. In addition to simply increasing the capacity of both wireline and wireless networks, companies in the Carrier-Focused Telecom Technology sector are also helping customers perform a variety of other critical functions including network planning and optimization, network monitoring, service assurance, network testing and service delivery and monetization. While some of the largest technology companies in the world are helping to meet many of these challenges, we believe there is significant innovation among middle market technology providers and ample opportunities for them to create meaningful value for their shareholders. FOCUS is proud of its commitment to the Carrier-Focused Telecom Technology sector and we are excited about the prospects for middle market companies in this space.

The FOCUS Telecom Technology and Services group consists of professionals with substantial expertise in both Telecom and investment banking. The FOCUS Telecom team is uniquely qualified to help middle market clients reach their strategic objectives because the group:

- Devotes significant senior level resources to executing transactions for lower middle market clients,
- Has a breadth of knowledge that covers most segments of the telecom industry,
- Has a proven transaction methodology for delivering results,
- Is equally comfortable with buy side and sell side M&A,
- Leverages an experienced team of research professionals,
- Has a national presence with coverage of both East and West coasts.

Sub Sector Definitions

Large Cap: Large, diversified companies with products across a variety of sub sectors

OSS/BSS Software: Software systems that manage and bill the customer base and monitor and maintain telecom networks

IP Networking: Carrier Ethernet switching, routers and IP Multimedia Subsystem ("IMS") components

Wireline Access and Transport: DSL equipment, PON equipment and WDM-based transport

Cable and Video: Products such as headends and servers that support video delivery as well as broadband products for cable networks

Broadband Wireless: High capacity, fixed wireless equipment

Test and Measurement: Equipment used by both service providers and manufacturers to test and monitor networks and equipment

Summary Comments

Public Markets

The FOCUS Carrier-Focused Telecom Technology Index (CFTTI) suffered a second straight reporting period in negative territory, although the decline this period was only slight at 0.3%. Even with this period's decline, the sector still outperformed both the S&P 500 (down 4.2%) and the NASDAQ (down 11.5%) over this past three months. The sector still remains in positive territory for the full year with a gain of 12.6%. This gain lagged the 14.8% increase in the S&P 500 over the past year, but was higher than the 4.2% gain in the NASDAQ. Sub sector multiples ticked up slightly compared to a year ago. The sub sector revenue multiple went from 2.3x to 2.5x, while the sub sector EBITDA multiple expanded from 11.2x to 12.0x.

Large Cap

The Large Cap sub sector turned in a very modest gain of 0.2% over our current three-month reporting period. Juniper and Cisco both delivered positive returns, but losses at all of the other companies in the sub sector dragged down overall performance to a more or less breakeven level. For the full year, the sub sector was up 16.1%. Ericsson suffered the biggest losses in the sub sector over this time period, while Cisco, Juniper and Nokia all turned in strong gains. Sub sector multiples closed out the period at 2.5x revenue and 11.6x EBITDA. Both of these represent increases compared to this time last year when multiples were 2.2x revenue and 10.3x EBITDA.

OSS/BSS Software

The OSS/BSS software sub sector was the CFTTI's top performing sub sector this period with a three-month gain of 9.2%. Gains were broad-based as six of the 10 companies in the sub sector were in positive territory over the period. This included a 150% gain at Pareteum as well as a 28.5% gain at Optiva and a 17.1% gain at CSG Systems. Full year performance was not quite as robust with a year-over-year gain of 7.8%. Tecnotree and CSG Systems were the top performers over the past 12 months, while the steepest losses belonged to Pareteum and Synchronoss. The sub sector revenue multiple increased slightly from 2.2x to 2.3x, while the sub sector EBITDA multiple also enjoyed a slight increase from 11.1x to 11.5x

IP Networking

At the other end of the spectrum, the 29.1% drop in the IP Networking sub sector placed it squarely in the cellar of the CFTTI in terms of performance. Ribbon Communications had the steepest decline as it shed more than 40% of its value this period, but both of the other companies in the sub sector also experienced double digit declines. The sub sector is also the CFTTI's worst performing sub sector over the past year with a drop of 38.6%. Losses were broad-based as every company in the sub sector is trading lower than it was a year ago. As one might expect, sub sector multiples are also significantly lower than they were a year ago. The revenue multiple dropped a full turn from 2.4x a year ago to 1.4x currently. The drop in EBITDA multiple was equally precipitous as it declined from 13.8x to 9.8x over the same time frame.

Wireline Access and Transport

The Wireline Access and Transport sub sector continued to move in the right direction with a gain of 3.4% in the current reporting period. ADVA, CIENA, Dasan Zhong Solutions and Infinera all enjoyed double digit gains this period. One company in the sub sector that did not fare well this period was Calix, which plummeted 18.8% in the past three months. The sub sector is the top performing sub sector in the CFTTI over the past year with a gain of 25.4%. Calix remains a top performer for the full year with a gain of 37.5%, and the sub sector also benefited from a more than doubling at Tejas Networks. Sub sector multiples ended the period at 2.5x revenue (compared to 2.1x a year ago) and 20.4x EBITDA (up from 17.0x a year ago).

Cable and Video

The Cable and Video sub sector was once again in negative territory after an 11.8% decline this period. The only stock in the sub sector that was not in negative territory was Seachange Technologies, which benefited from the announcement of its pending acquisition by Triller. The sub sector is also down 11.8% over the full year. In addition to Seachange Technologies, Harmonic also buoyed the sub sector with a strong positive return. Sub sector multiples were down sharply compared to last year. The revenue multiple declined from 2.1x to 1.7x, while the EBITDA multiple fell from 37.3x to 23.3x.

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Broadband Wireless

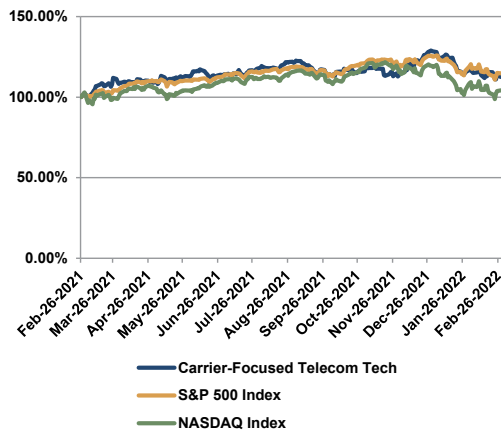
The Broadband Wireless sub sector continued to head in the wrong direction with a loss of 14.6% in the last three months. Four of the six stocks in the index were in negative territory, including a more than 15% decline at Ubiquiti Networks. The sub sector is also down 21.4% over the past 12 months with Redline Communications the only company in positive territory over this time frame. Multiples have also fallen as investors have become less bullish on the sub sector's future prospects. Whereas multiples at this time last year were 9.0x revenue and 31.8x EBITDA, they now stand at only 5.9x revenue and 23.5x EBITDA.

Test and Measurement

The Test and Measurement sub sector continued to struggle as it fell 0.3% in our spring reporting period. Viavi managed a nice gain of 10.7%, but losses at Anritsu and Spirent cancelled this out. The sub sector also remains solidly in negative territory for the full year with a decline of 11.4%. Sub sector multiples have also declined over the past year, dropping from 3.0x revenue and 13.5x EBITDA a year ago to current values of 2.6x revenue and 12.4x EBITDA.

Carrier-Focused Telecom Technology: Public Market Summary

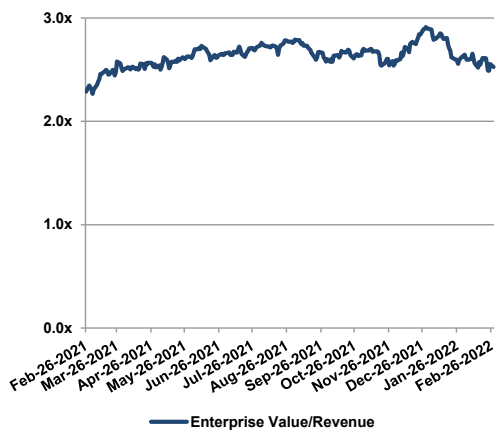
Twelve Month Index Returns



Sector and Sub Sector Returns

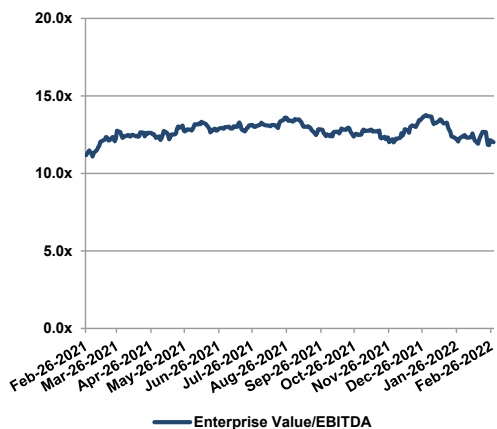
	12 Month	3 Month
Carrier-Focused Telecom Tech	12.6%	-0.3%
Large Cap	16.1%	0.2%
OSS/BSS	7.8%	9.2%
IP Networking	-38.6%	-29.1%
Wireline Access and Transport	25.4%	3.4%
Cable and Video	-11.8%	-11.8%
Broadband Wireless	-21.4%	-14.6%
Test and Measurement	-11.4%	-0.3%
S&P 500	14.8%	-4.2%
NASDAQ	4.2%	-11.5%

Revenue Multiple Trends



Sector and Sub Sector Revenue Multiples

EBITDA Multiple Trends



Sector and Sub Sector EBITDA Multiples

Source: Capital IQ

M&A Summary Comments

M&A

While M&A activity did pick up somewhat compared to our winter reporting period, with a total of only 10 transactions in the last three months the number of deals still remained low by historical standards. Furthermore, there were no transactions with announced dollar values this period. Looking back on all of 2021, the level of M&A activity was relatively healthy. The 51 total announced transactions was in line with historical norms, while the \$5.6 billion in total announced transaction dollar volume was the second highest total of any year in the last five. While 2022 is off to a slow start with only six transactions through the first two months of the year, there is still plenty of time for activity levels to pick up.

OSS/BSS Software

The OSS/BSS Software sub sector accounted for seven transactions this period. Mobileum swapped out private equity backers with a new majority investment from H.I.G. Capital, while Rakuten Mobile inked another deal with its acquisition of container orchestration company Robin.io. After a bit of a hiatus from the deal market, TEOCO completed the acquisition of routing optimization vendor Software Synergy. In the final acquisition that we will note, broadband network management and analytics company OpenVault acquired network monitoring company VelociData to expand both its technology and customer base.

IP Networking

The only transaction in the IP Networking sub sector was Pentanet's acquisition of Canopus Networks. Canopus Networks provides software defined networking technology that helps improve the customer experience during periods of network congestion.

Wireline Access and Transport

There were no transactions in the Wireline Access and Transport sub sector this period.

Cable and Video

Publicly-traded Seachange Technologies announced that the company would be acquired by Triller. Seachange Technologies provides over the top and other video-related solutions for network operators.

Broadband Wireless

In the Broadband Wireless sub sector, NEC acquired coherent massive MIMO vendor Blue Danube Systems.

Test and Measurement

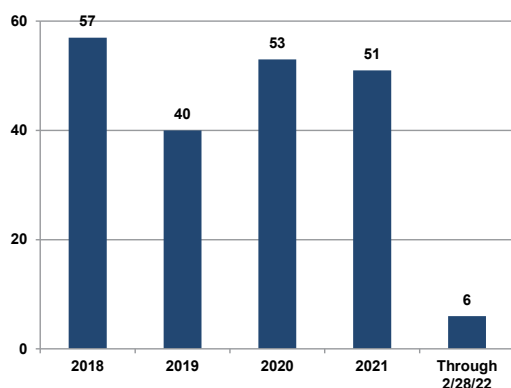
There were no transactions in the Test and Measurement sub sector this period.

Transactions with Multiples

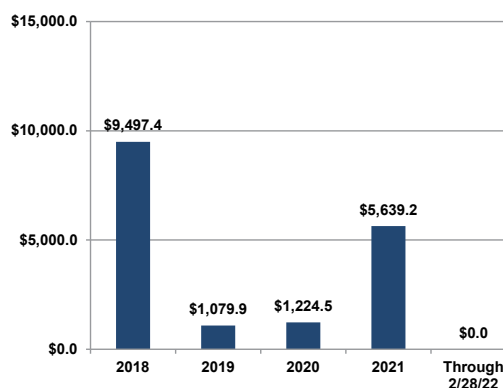
There were no transactions with announced multiples this period.

Carrier-Focused Telecom Technology: M&A Summary

M&A Activity: Number of Transactions



M&A Activity (\$ Value of Transactions in Millions)



M&A Announced Transactions (12/1/21 – 2/28/22)

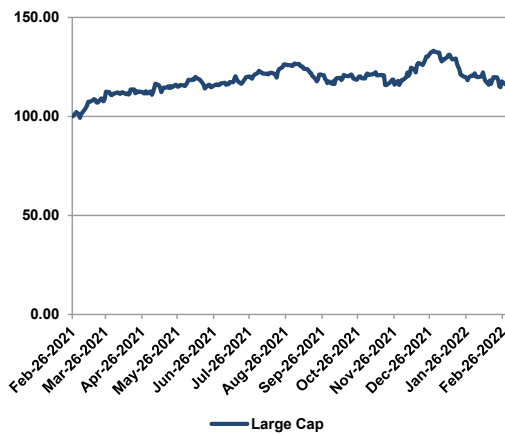
Acquiror	Target	Sector	Date Announced	Purchase Price	Description
Rakuten Mobile	Robin.io	OSS/BSS Software	2/28/22	NA	Cloud-native process automation and container orchestration SaaS and software for businesses and telecom carriers.
TEOCO Corporation	Software Synergy	OSS/BSS Software	2/16/22	NA	Automated, intelligent network-wide routing and optimization solutions for the planning and management of telecom networks.
Tofane Global	Simfony	OSS/BSS Software	2/16/22	NA	Whitelabel IoT connectivity platform for MVNOs based on either a cloud or on-premise deployment.
H.I.G. Capital	Mobileum	OSS/BSS Software	1/31/22	NA	Solutions for roaming and network services, network security, risk management, connectivity testing and subscriber intelligence.
NEC	Blue Danube Systems	Broadband Wireless	1/27/22	NA	Coherent massive MIMO solution that uses 5G beamforming to increase network capacity and improve the end user experience.
Destiny	Meridix Systems	OSS/BSS Software	1/11/22	NA	Web-based analytics and reporting platform for communication service providers.
Triller	SeaChange Technologies	Cable and Video	12/22/21	NA	Multiscreen, advertising and over the top video products and services for cable, telecom and satellite operators.
Pentanet	Canopus Networks	IP Networking	12/20/21	NA	Software defined networking and artificial intelligence technologies that protect user experience during periods of network congestion.
Ziff Davis	RootMetrics	OSS/BSS Software	12/14/21	NA	Network drive testing and analytics solutions.
OpenVault	VelociData	OSS/BSS Software	12/8/21	NA	Network monitoring SaaS for the telecom sector with features for network data collection and streaming network traffic data.

M&A Announced Transactions with Revenue Multiples (3/1/21 – 2/28/22)

Acquiror	Target	Sector	Date Announced	Purchase Price	Revenue Multiple	EBITDA Multiple	Description
Partner One Capital	Evolving Systems (Activation and Marketing Business)	OSS/BSS Software	10/18/21	\$40.0	1.5 x	17.4 x	Network management software that provides local number portability, number inventory, network mediation and service assurance.
ADTRAN	Adva Optical Networks	Wireline Access and Transport	8/30/21	\$1,066.4	1.5 x	12.2 x	Optical and Ethernet-based networking solutions to deliver data, storage, voice and video services.
Management	EXFO	Test and Measurement	6/7/21	\$366.1	1.3 x	24.3 x	Test, monitoring and analytics solutions for fixed and mobile network operators, web-scale companies and equipment manufacturers.
Amino Technologies	24i Unit Media	Cable and Video	5/27/21	\$6.5	1.4 x	NA	Develops and markets television and video-on-demand software for telcos, cable television operators and Internet service providers.
Spirent Communications	octoScope	Test and Measurement	3/5/21	\$55.0	2.8 x	NA	Wireless test solutions and methodologies for Wi-Fi and 5G testing in emulated real-world environments.

Sub Sector Analysis: Large Cap

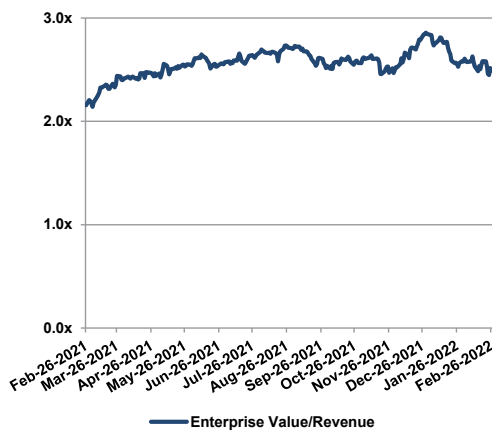
Twelve Month Index Returns



Company Returns

	12 Month	3 Month
Large Cap Index	16.1%	0.2%
Cisco	24.3%	1.7%
Ericsson	-25.9%	-7.2%
Juniper	45.1%	8.5%
Nokia	36.1%	-1.9%
ZTE	-6.1%	-4.4%

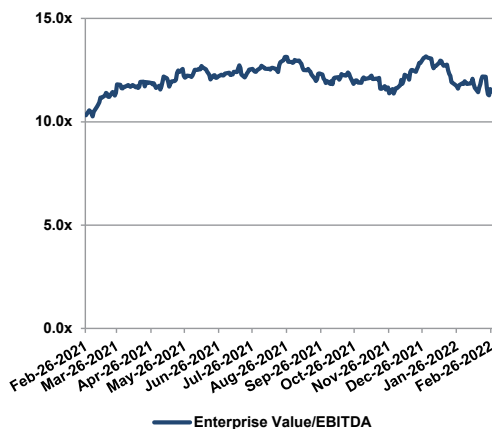
Revenue Multiple Trends



Company Revenue Multiples

	2/28/2022	2/28/2021
Large Cap Index	2.5x	2.2x
Cisco	4.3x	3.6x
Ericsson	1.1x	1.4x
Juniper	2.4x	1.8x
Nokia	1.0x	0.8x
ZTE	1.1x	1.4x

EBITDA Multiple Trends



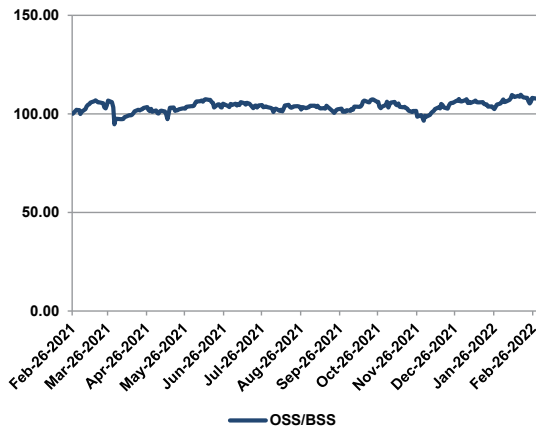
Company EBITDA Multiples

	2/28/2022	2/28/2021
Large Cap Index	11.6x	10.3x
Cisco	14.0x	11.4x
Ericsson	6.8x	9.6x
Juniper	17.0x	12.5x
Nokia	8.1x	6.5x
ZTE	16.4x	22.4x

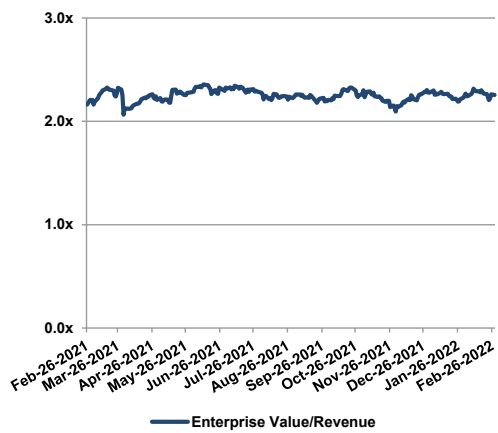
Source: Capital IQ

Sub Sector Analysis: OSS/BSS Software

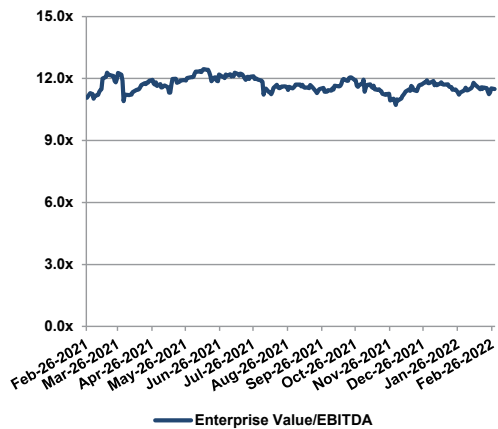
Twelve Month Index Returns



Revenue Multiple Trends



EBITDA Multiple Trends



Source: Capital IQ

Company Returns

	12 Month	3 Month
OSS/BSS Index	7.8%	9.2%
Amdocs	3.8%	12.7%
CSG Systems	33.7%	17.1%
Evolving Systems	-32.4%	-19.8%
NetScout	10.3%	4.1%
Optiva	-12.1%	28.5%
Pareteum	-90.6%	150.0%
Radcom	16.7%	2.7%
Subex	30.0%	-27.5%
Synchronoss	-63.7%	-40.4%
Tecnotree	88.4%	-8.7%

Company Revenue Multiples

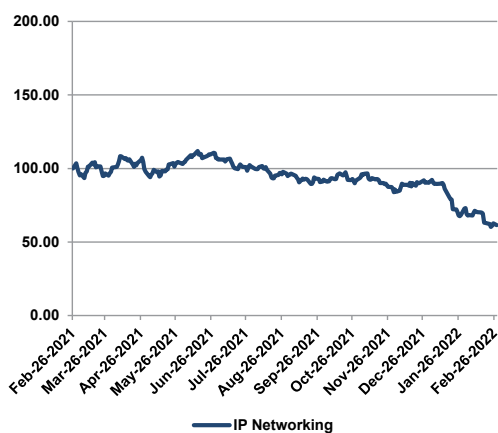
	2/28/2022	2/28/2021
OSS/BSS Index	2.3x	2.2x
Amdocs	2.3x	2.3x
CSG Systems	2.1x	1.7x
Evolving Systems	0.8x	1.2x
NetScout Systems	2.5x	2.5x
Optiva	2.7x	2.5x
Pareteum	0.2x	1.4x
Radcom	2.4x	1.9x
Subex	5.3x	3.4x
Synchronoss	1.3x	1.5x
Tecnotree	5.4x	3.1x

Company EBITDA Multiples

	2/28/2022	2/28/2021
OSS/BSS Index	11.5x	11.1x
Amdocs	11.8x	12.0x
CSG Systems	13.3x	10.1x
Evolving Systems	8.0x	15.2x
NetScout Systems	12.6x	14.7x
Optiva	10.8x	217.0x
Pareteum	NM	NM
Radcom	NM	NM
Subex	30.0x	12.6x
Synchronoss	16.0x	NM
Tecnotree	14.5x	8.6x

Sub Sector Analysis: IP Networking

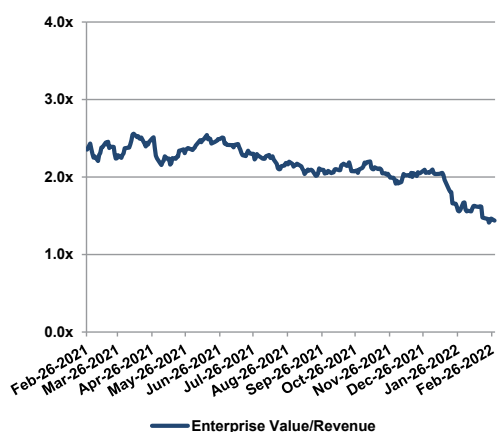
Twelve Month Index Returns



Company Returns

	12 Month	3 Month
IP Networking Index	-38.6%	-29.1%
Allot Communications	-43.9%	-28.9%
Audiocodes	-0.5%	-18.2%
Ribbon Communications	-64.8%	-44.2%

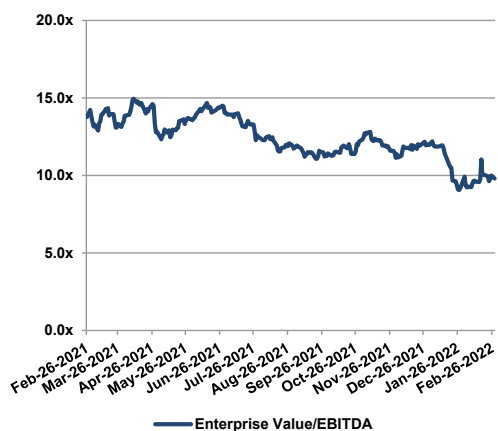
Revenue Multiple Trends



Company Revenue Multiples

	2/28/2022	2/28/2021
IP Networking Index	1.4x	2.4x
Allot Communications	1.5x	3.1x
Audiocodes	3.1x	3.6x
Ribbon Communications	0.9x	1.9x

EBITDA Multiple Trends



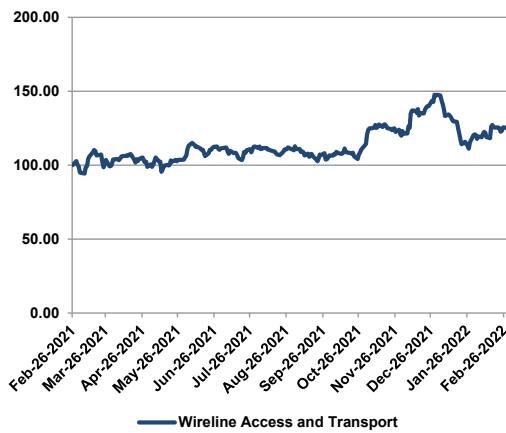
Company EBITDA Multiples

	2/28/2022	2/28/2021
IP Networking Index	9.8x	13.8x
Allot Communications	NM	NM
Audiocodes	18.4x	19.4x
Ribbon Communications	7.7x	13.8x

Source: Capital IQ

Sub Sector Analysis: Wireline Access and Transport

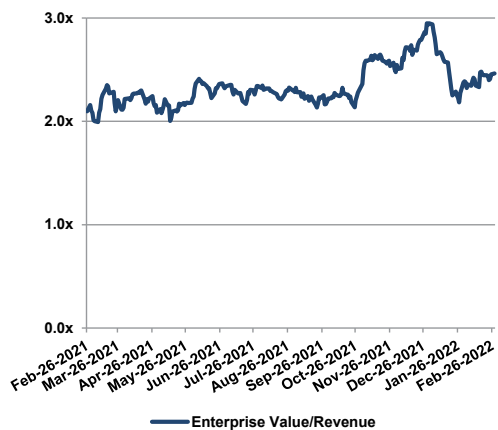
Twelve Month Index Returns



Company Returns

	12 Month	3 Month
Wireline Access & Transport Index	25.4%	3.4%
ADTRAN	22.3%	1.0%
ADVA	52.5%	17.1%
BATM	-49.5%	-32.5%
Calix	37.5%	-18.8%
CIENA	31.1%	13.6%
Dasan Zhone Solutions	-12.9%	11.8%
Infinera	-6.1%	13.5%
Tejas Networks	107.2%	-9.4%

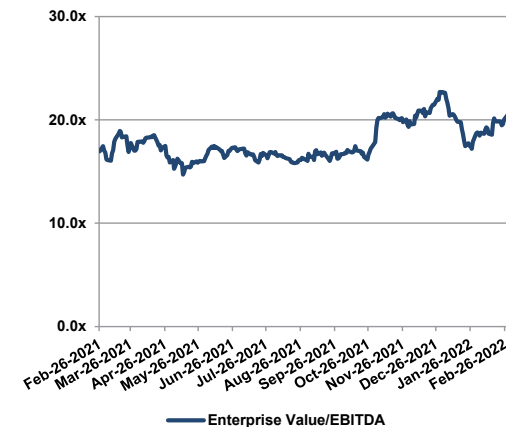
Revenue Multiple Trends



Company Revenue Multiples

	2/28/2022	2/28/2021
Wireline Access & Transport Index	2.5x	2.1x
ADTRAN	1.7x	1.5x
ADVA	1.2x	0.8x
BATM	1.8x	3.1x
Calix	4.9x	4.3x
CIENA	2.6x	2.2x
DASAN Zhone Solutions	1.0x	1.5x
Infinera	1.6x	1.7x
Tejas Networks	5.5x	3.8x

EBITDA Multiple Trends



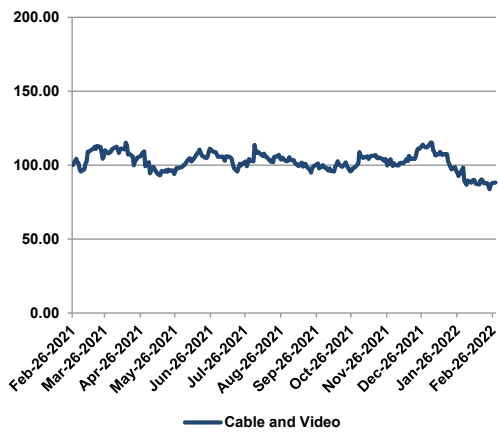
Company EBITDA Multiples

	2/28/2022	2/28/2021
Wireline Access & Transport Index	20.4x	17.0x
ADTRAN	NM	50.1x
ADVA	10.5x	9.8x
BATM	15.2x	35.6x
Calix	37.6x	41.4x
CIENA	15.9x	11.9x
DASAN Zhone Solutions	NM	NM
Infinera	267.3x	NM
Tejas Networks	NM	NM

Source: Capital IQ

Sub Sector Analysis: Cable and Video

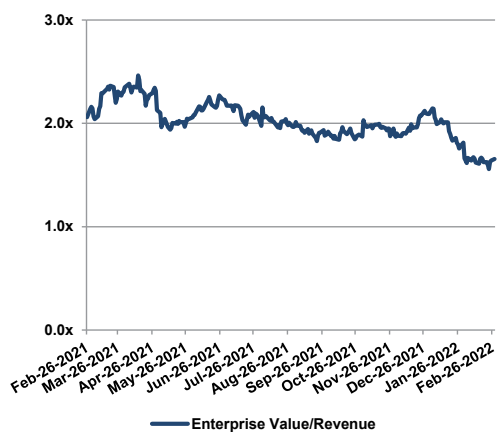
Twelve Month Index Returns



Company Returns

	12 Month	3 Month
Cable and Video Index	-11.8%	-11.8%
Aferian	-7.5%	-8.2%
Casa Systems	-49.3%	-16.6%
Harmonic	20.2%	-13.4%
SeaChange	9.3%	74.0%

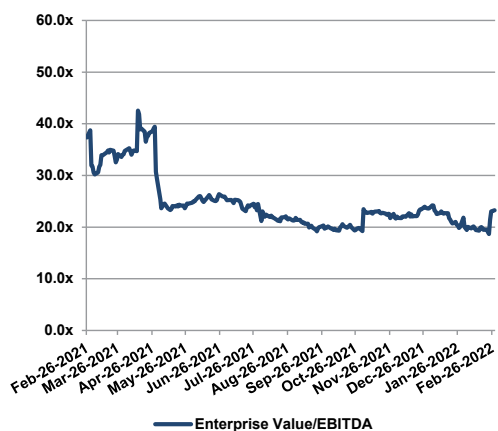
Revenue Multiple Trends



Company Revenue Multiples

	2/28/2022	2/28/2021
Cable and Video Index	1.7x	2.1x
Aferian	1.6x	1.8x
Casa Systems	1.2x	2.1x
Harmonic	2.0x	2.1x
SeaChange	2.0x	2.1x

EBITDA Multiple Trends



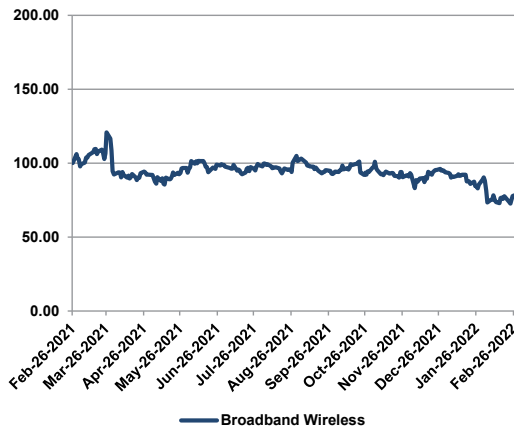
Company EBITDA Multiples

	2/28/2022	2/28/2021
Cable and Video Index	23.3x	37.3x
Aferian	16.1x	18.0x
Casa Systems	16.2x	19.5x
Harmonic	31.4x	121.9x
SeaChange	NM	NM

Source: Capital IQ

Sub Sector Analysis: Broadband Wireless

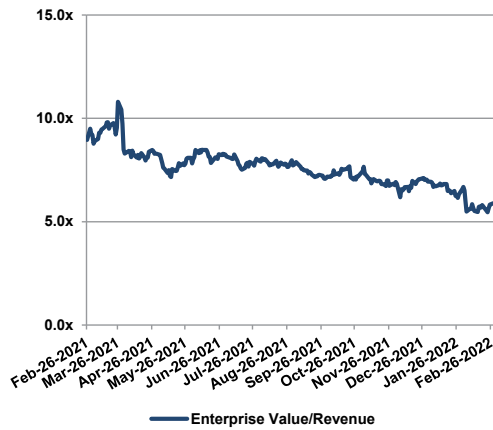
Twelve Month Index Returns



Company Returns

	12 Month	3 Month
Broadband Wireless Index	-21.4%	-14.6%
Airspan Networks	-60.9%	-24.5%
Aviat Networks	-7.7%	-9.7%
Cambium Networks	-34.2%	2.2%
Ceragon Networks	-49.1%	-14.8%
Redline Communications	23.0%	7.3%
Ubiquiti Networks	-20.4%	-15.2%

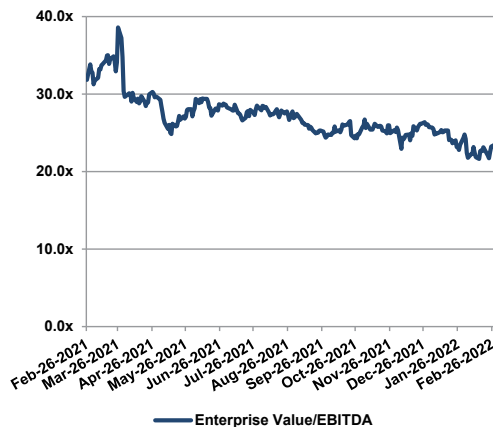
Revenue Multiple Trends



Company Revenue Multiples

	2/28/2022	2/28/2021
Broadband Wireless Index	5.9x	9.0x
Airspan Networks	1.6x	NM
Aviat Networks	1.0x	1.2x
Cambium Networks	2.1x	3.9x
Ceragon Networks	0.7x	1.3x
Redline Communications	0.4x	0.2x
Ubiquiti Networks	8.7x	12.8x

EBITDA Multiple Trends



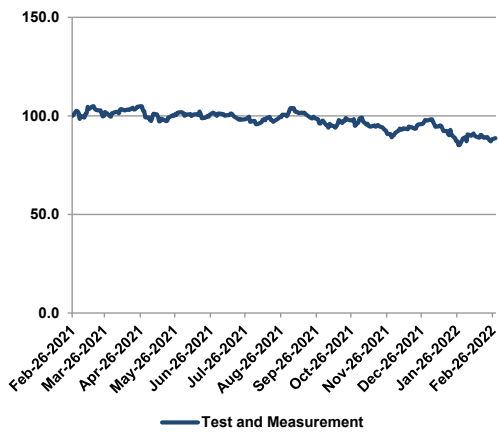
Company EBITDA Multiples

	2/28/2022	2/28/2021
Broadband Wireless Index	23.5x	31.8x
Airspan Networks	NM	NM
Aviat Networks	9.0x	12.0x
Cambium Networks	17.2x	33.4x
Ceragon Networks	12.1x	76.6x
Redline Communications	NM	NM
Ubiquiti Networks	24.1x	32.2x

Source: Capital IQ

Sub Sector Analysis: Test and Measurement

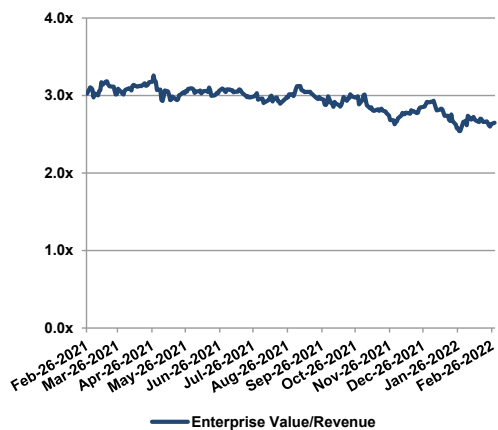
Twelve Month Index Returns



Company Returns

	12 Month	3 Month
Test and Measurement Index	-11.4%	-0.3%
Anritsu	-34.8%	-10.7%
Spirent	-0.6%	-8.1%
Viavi	1.3%	10.7%

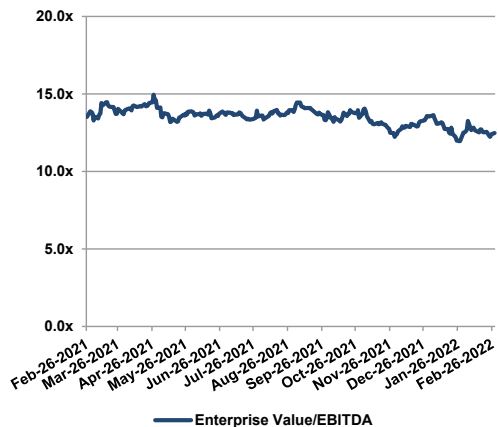
Revenue Multiple Trends



Company Revenue Multiples

	2/28/2022	2/28/2021
Test and Measurement Index	2.6x	3.0x
Anritsu	1.6x	2.5x
Spirent	3.2x	3.4x
Viavi	3.1x	3.4x

EBITDA Multiple Trends



Company EBITDA Multiples

	2/28/2022	2/28/2021
Test and Measurement Index	12.4x	13.5x
Anritsu	7.9x	10.4x
Spirent	14.7x	15.8x
Viavi	15.4x	18.0x

Source: Capital IQ

FOCUS Telecom Technology and Services Team



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Rich Pierce has 20 years of investment banking experience advising middle market clients on a variety of mergers and acquisitions and capital raising transactions. During that time, Mr. Pierce's primary emphasis has been on serving clients in the telecommunications industry including providers of network related hardware and software products, wireless and wireline telecommunications service providers and network engineering and construction companies.



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