

## Routing Trends

# Routing market growth takes a nosedive in 3Q23

Industry Overview

### Normalization of backlog levels driving down growth

The Service Provider (SP) routing market (ex-China) declined 7% YoY in 3Q23, a notable deceleration from the 19.6% and 13.2% growth levels seen in 1Q23 and 2Q23, respectively. On one hand, we see support for SP's modernization of Internet Protocol (IP) fronthaul and backhaul networks. However, Service Providers are going through a period of lower spending and inventory digestion, with higher interest rates also putting a lid on investments. This was reflected in the 3Q results of networking vendors, with Juniper's SP revenue down 20% YoY and Cisco's SP orders down 38%. We expect the weakness to likely linger throughout 2024, especially in 1H24. We exclude China from our analysis as most Western vendors do not sell into the region.

### Core routing growth continues, mostly supported by Cisco

The core routing market has historically underperformed the edge routing market, as rapid innovation and intense competition brought pricing down faster than traffic growth. Yet, the core routing market grew 7.8% YoY in 3Q23, while the edge routing market declined 11.3% YoY. However, this conclusion is somewhat misleading, as the market is inflated by the inclusion of Cisco's Silicon One and optics products. This inclusion has driven Cisco's share from ~61% in 2022 to 74% in 3Q23, an outlier data point to the trends seen by all other vendors. Cisco's core routing revenue grew 26% YoY, while Nokia's segment revenue declined a whopping 71.8% YoY. Huawei's (ex-China) core routing revenue was down 19.1% YoY, Juniper was down 17%, and ZTE declined 14.8% YoY in 3Q. On a market share basis, Huawei declined from 10.7% in 3Q22 to 8.1% in 3Q23; Juniper declined from 21% to 16.1%; ZTE declined slightly from 0.6% to 0.5%.

### Edge routing market in decline on project slowdowns

Edge routing remains the bulk of the routing market, or 74% of the total market in 3Q. Demand for edge routers is supported by both bandwidth demand and a large service element. However, the edge routing market declined 11.3% YoY in 3Q23 vs. the +6.1% and +20.6% growth seen in 2Q23 and 1Q23, respectively. We attribute the growth decline to weak service provider spending, and a slowdown in 5G deployments. Cisco's 3Q edge routing revenue declined 17.8% YoY, with its market share declining 230bps YoY to 28.9%. Nokia and Juniper also saw revenue declines of 21.9% and 19.1% YoY, respectively, losing 320bps and 170bps of market share YoY. On the other hand, Huawei (ex-China) had a strong quarter with 5G backhaul deployments in LATAM, driving its edge routing revenue up 22.6% YoY, with the vendor's market share climbing from 16% in 3Q22 to 22.1% in 3Q23.

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### Glossary

- IP = Internet Protocol
- SP = Service Provider

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# Routing Market Overview

We present the total market data first, followed by the Core and Edge segments. Note: figures are ex-China

## Total Routing Market Trends

### Exhibit 1: Snapshot of the Total Routing Market ex-China

The total routing market ex-China declined 7% in 3Q23, as depleted backlog levels now only offer limited support

	1Q19	2Q19	3Q19	4Q19	1Q20	2Q20	3Q20	4Q20	1Q21	2Q21	3Q21	4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23		CY19	CY20	CY21	CY22
	19-Mar	19-Jun	19-Sep	19-Dec	20-Mar	20-Jun	20-Sep	20-Dec	21-Mar	21-Jun	21-Sep	21-Dec	22-Mar	22-Jun	22-Sep	22-Dec	23-Mar	23-Jun	23-Sep	23-Dec					
Revenue (\$mn)	\$2,104	\$2,255	\$2,216	\$2,366	\$1,733	\$2,099	\$2,126	\$2,553	\$2,213	\$2,355	\$2,384	\$2,713	\$2,291	\$2,534	\$2,606	\$2,851	\$2,741	\$2,868	\$2,423			\$8,940	\$8,511	\$9,665	\$10,282
QoQ Chg (%)	-17.2%	7.2%	-1.7%	6.8%	-26.8%	21.1%	1.3%	20.1%	-13.3%	6.4%	1.2%	13.8%	-15.5%	10.6%	2.8%	9.4%	-3.9%	4.6%	-15.5%			-0.3%	-4.8%	13.6%	6.4%
YoY Chg (%)	4.1%	4.9%	-1.9%	-6.9%	-17.6%	-6.9%	-4.1%	7.9%	27.7%	12.2%	12.1%	6.2%	3.5%	7.6%	9.3%	5.1%	19.6%	13.2%	-7.0%						
Market Share (%)																									
Cisco	41.5%	37.9%	37.2%	34.5%	36.0%	36.3%	39.9%	28.3%	38.3%	39.2%	39.7%	36.9%	39.7%	35.0%	38.4%	35.8%	39.4%	39.8%	40.6%			37.7%	34.7%	38.5%	37.1%
Huawei	12.8%	15.7%	16.1%	17.8%	16.7%	17.6%	10.5%	24.2%	15.3%	18.0%	17.3%	18.7%	16.2%	19.5%	14.8%	17.1%	14.3%	21.3%	18.4%			15.7%	17.6%	17.4%	16.9%
Nokia	23.9%	24.1%	24.1%	25.8%	24.7%	24.0%	27.2%	26.5%	25.4%	23.0%	24.4%	23.7%	23.6%	21.9%	21.9%	25.4%	23.0%	17.2%	17.9%			24.5%	25.7%	24.1%	23.2%
Juniper	17.6%	18.4%	18.2%	17.8%	17.9%	19.0%	19.9%	17.5%	16.7%	16.0%	15.7%	17.8%	16.1%	17.8%	19.9%	16.3%	16.9%	16.1%	17.4%			18.0%	18.5%	16.6%	17.5%
ZTE	2.3%	2.0%	2.5%	2.3%	2.0%	1.0%	0.6%	1.7%	2.4%	2.0%	1.1%	1.2%	1.0%	0.8%	0.7%	1.6%	1.6%	1.8%	1.1%			2.3%	1.3%	1.6%	1.0%
Ciena	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	2.0%	1.7%	1.4%	2.2%	1.8%	2.0%			0.0%	0.0%	0.0%	1.5%
Ericsson	0.6%	0.6%	0.6%	0.7%	1.3%	0.9%	0.8%	0.7%	0.8%	0.7%	0.7%	0.6%	0.8%	1.5%	1.5%	1.5%	1.2%	1.1%	1.3%			0.6%	0.9%	0.7%	1.3%
Alaxala	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%	0.1%	0.6%	0.6%	0.3%	0.0%	0.5%	0.1%	0.4%			0.0%	0.0%	0.1%	0.3%
Infinera	0.4%	0.4%	0.2%	0.4%	0.5%	0.3%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0.3%	0.3%	0.2%	0.0%
Other	0.9%	0.9%	0.9%	0.9%	0.8%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.8%	0.8%			0.9%	0.9%	0.9%	0.9%

Source: Omdia

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### Exhibit 2: Total Routing ex-China as a Percentage of the Total Global Routing Market

The China routing market saw some sequential decline, with total routing ex-China increasing from 75.1% of the total global routing market in 2Q23 to 81.3% in 3Q23

	1Q19	2Q19	3Q19	4Q19	1Q20	2Q20	3Q20	4Q20	1Q21	2Q21	3Q21	4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23	CY19	CY20	CY21	CY22
	19-Mar	19-Jun	19-Sep	19-Dec	20-Mar	20-Jun	20-Sep	20-Dec	21-Mar	21-Jun	21-Sep	21-Dec	22-Mar	22-Jun	22-Sep	22-Dec	23-Mar	23-Jun	23-Sep	23-Dec				
Total ex-China as % of Global	72.0%	69.0%	72.1%	69.4%	71.8%	65.4%	72.6%	71.8%	77.6%	72.4%	76.5%	73.7%	78.1%	75.5%	79.8%	80.3%	81.3%	75.1%	81.3%		70.5%	70.3%	74.9%	78.4%

Source: Omdia

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### Exhibit 3: Core and Edge Routing ex-China as a Percentage of the Total Routing Market ex-China

Edge routing grew from a 72.7% contribution of the total routing market in 2Q23 to 74% in 3Q23

	1Q19	2Q19	3Q19	4Q19	1Q20	2Q20	3Q20	4Q20	1Q21	2Q21	3Q21	4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23	CY19	CY20	CY21	CY22
	19-Mar	19-Jun	19-Sep	19-Dec	20-Mar	20-Jun	20-Sep	20-Dec	21-Mar	21-Jun	21-Sep	21-Dec	22-Mar	22-Jun	22-Sep	22-Dec	23-Mar	23-Jun	23-Sep	23-Dec				
Core as % of Total (ex-China)	26.1%	23.5%	22.8%	22.4%	23.8%	23.3%	23.9%	19.6%	24.2%	23.8%	23.4%	23.1%	25.6%	22.4%	22.5%	21.8%	25.0%	27.3%	26.0%		23.6%	22.4%	23.6%	23.0%
Edge as % of Total (ex-China)	73.9%	76.5%	77.2%	77.6%	76.2%	76.7%	76.1%	80.4%	75.8%	76.2%	76.6%	76.9%	74.4%	77.6%	77.5%	78.2%	75.0%	72.7%	74.0%		76.4%	77.6%	76.4%	77.0%

Source: Omdia

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## Core Routing Market Trends

### Exhibit 4: Snapshot of the Core Routing Market ex-China

Core routing was 26% of the total routing market ex-China in 3Q23, up 7.8% YoY

	1Q19	2Q19	3Q19	4Q19	1Q20	2Q20	3Q20	4Q20	1Q21	2Q21	3Q21	4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23		CY19	CY20	CY21	CY22
	19-Mar	19-Jun	19-Sep	19-Dec	20-Mar	20-Jun	20-Sep	20-Dec	21-Mar	21-Jun	21-Sep	21-Dec	22-Mar	22-Jun	22-Sep	22-Dec	23-Mar	23-Jun	23-Sep	23-Dec					
Revenue (\$mn)	\$548	\$530	\$505	\$529	\$412	\$490	\$508	\$500	\$536	\$560	\$557	\$628	\$586	\$569	\$585	\$621	\$684	\$782	\$631			\$2,112	\$1,910	\$2,281	\$2,360
QoQ Chg (%)	-4.2%	-3.4%	-4.7%	4.9%	-22.2%	19.0%	3.8%	-1.7%	7.3%	4.4%	-0.5%	12.6%	-6.7%	-2.9%	2.9%	6.1%	10.2%	14.3%	-19.3%						
YoY Chg (%)	17.2%	-8.5%	-15.5%	-7.5%	-24.9%	-7.5%	0.7%	-5.6%	30.2%	14.3%	9.6%	25.6%	9.3%	1.6%	5.0%	-1.1%	16.8%	37.5%	7.8%			-4.7%	-9.6%	19.4%	3.5%
Market Share (%)																									
Cisco	51.9%	39.6%	43.5%	44.6%	49.9%	48.5%	49.2%	43.4%	57.9%	58.2%	56.7%	55.0%	61.8%	59.6%	63.2%	58.3%	67.5%	70.8%	73.8%			45.0%	47.7%	56.8%	60.7%
Huawei	11.5%	19.5%	16.4%	18.0%	13.4%	11.4%	14.1%	17.3%	10.3%	12.0%	12.5%	16.9%	9.6%	12.2%	10.7%	15.4%	8.7%	8.9%	8.1%			16.3%	14.1%	13.1%	12.0%
Nokia	7.9%	8.7%	9.0%	9.7%	8.3%	7.9%	4.1%	5.9%	3.0%	2.8%	3.1%	3.0%	2.7%	2.8%	4.0%	4.8%	3.8%	1.3%	1.1%			8.8%	6.4%	3.0%	3.6%
Juniper	26.4%	30.2%	28.7%	24.9%	26.0%	31.0%	31.8%	30.9%	26.3%	25.5%	26.5%	23.7%	24.8%	24.4%	21.0%	19.4%	18.3%	17.6%	16.1%			27.5%	30.1%	25.4%	22.3%
ZTE	1.8%	1.5%	1.9%	2.4%	1.8%	0.8%	0.4%	2.1%	2.1%	1.1%	0.8%	1.1%	0.6%	0.6%	0.6%	1.7%	1.3%	1.1%	0.5%			1.9%	1.2%	1.2%	0.9%
Other	0.5%	0.4%	0.4%	0.5%	0.4%	0.4%	0.5%	0.5%	0.4%	0.4%	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%			0.4%	0.4%	0.4%	0.4%

Source: Omdia

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### Exhibit 5: Core Routing ex-China as a Percentage of the Global Core Routing Market

Investments in core routing in China weakened in 3Q23, with core routing ex-China increasing to 78.5% of the global core routing market in 3Q23 from a 70% contribution last quarter

	1Q19	2Q19	3Q19	4Q19	1Q20	2Q20	3Q20	4Q20	1Q21	2Q21	3Q21	4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23	CY19	CY20	CY21	CY22
	19-Mar	19-Jun	19-Sep	19-Dec	20-Mar	20-Jun	20-Sep	20-Dec	21-Mar	21-Jun	21-Sep	21-Dec	22-Mar	22-Jun	22-Sep	22-Dec	23-Mar	23-Jun	23-Sep	23-Dec				
Core ex-China as % of Global	66.9%	60.0%	65.9%	57.7%	63.5%	57.6%	67.6%	59.0%	71.7%	63.9%	73.0%	64.6%	72.2%	64.2%	76.1%	74.7%	75.1%	70.0%	78.5%		62.4%	61.6%	67.9%	71.6%

Source: Omdia

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## Edge Routing Market Trends

### Exhibit 6: Snapshot of the Edge Routing Market ex-China

The edge routing market ex-China declined 11.3% YoY in 3Q23 vs. +10.6% growth a year ago, as SPs and cable companies are moderating their spending levels

	1Q19	2Q19	3Q19	4Q19	1Q20	2Q20	3Q20	4Q20	1Q21	2Q21	3Q21	4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23		CY19	CY20	CY21	CY22
	19-Mar	19-Jun	19-Sep	19-Dec	20-Mar	20-Jun	20-Sep	20-Dec	21-Mar	21-Jun	21-Sep	21-Dec	22-Mar	22-Jun	22-Sep	22-Dec	23-Mar	23-Jun	23-Sep	23-Dec					
Revenue (\$mn)	\$1,556	\$1,725	\$1,711	\$1,836	\$1,321	\$1,609	\$1,618	\$2,054	\$1,677	\$1,795	\$1,827	\$2,085	\$1,706	\$1,965	\$2,021	\$2,230	\$2,056	\$2,086	\$1,792			\$6,828	\$6,601	\$7,384	\$7,922
QoQ Chg (%)	-20.9%	10.9%	-0.8%	7.3%	-28.1%	21.8%	0.5%	27.0%	-18.4%	7.1%	1.7%	14.1%	-18.2%	15.2%	2.8%	10.4%	-7.8%	1.4%	-14.1%						
YoY Chg (%)	0.2%	9.9%	3.0%	-6.7%	-15.1%	-6.7%	-5.5%	11.8%	26.9%	11.6%	12.9%	1.5%	1.7%	9.5%	10.6%	7.0%	20.6%	6.1%	-11.3%			1.1%	-3.3%	11.9%	7.3%
Market Share (%)																									
Cisco	37.8%	37.4%	35.4%	31.6%	31.7%	32.6%	36.9%	24.6%	32.1%	33.3%	34.5%	31.5%	32.1%	27.9%	31.2%	29.6%	30.0%	28.1%	28.9%			35.4%	31.0%	32.8%	30.1%
Huawei	13.2%	14.6%	16.0%	17.7%	17.7%	19.5%	9.3%	25.8%	16.9%	19.8%	18.8%	19.2%	18.5%	21.6%	16.0%	17.5%	16.1%	26.0%	22.1%			15.5%	18.6%	18.7%	18.4%
Nokia	29.6%	28.8%	28.6%	30.5%	29.8%	28.9%	34.5%	31.5%	32.5%	29.3%	30.9%	29.9%	30.7%	27.5%	27.1%	31.1%	29.4%	23.2%	23.8%			29.4%	31.3%	30.6%	29.1%
Juniper	14.5%	14.7%	15.1%	15.7%	15.4%	15.3%	16.1%	14.3%	13.6%	13.1%	12.4%	16.0%	13.1%	15.9%	19.6%	15.5%	16.4%	15.5%	17.9%			15.0%	15.2%	13.9%	16.1%
ZTE	2.5%	2.1%	2.7%	2.2%	2.1%	1.1%	0.6%	1.6%	2.5%	2.2%	1.2%	1.2%	1.1%	0.9%	0.7%	1.6%	1.7%	2.1%	1.3%			2.4%	1.4%	1.8%	1.1%
Ciena	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	2.6%	2.1%	1.7%	2.9%	2.5%	2.7%			0.0%	0.0%	0.0%	2.0%
Ericsson	0.8%	0.8%	0.8%	0.8%	1.7%	1.2%	1.1%	0.9%	1.0%	0.9%	0.9%	0.8%	1.0%	1.9%	1.9%	2.0%	1.6%	1.6%	1.8%			0.8%	1.2%	0.9%	1.7%
Alaxala	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%	0.1%	0.8%	0.7%	0.3%	0.0%	0.7%	0.1%	0.6%			0.0%	0.0%	0.1%	0.5%
Infinera	0.5%	0.5%	0.3%	0.5%	0.6%	0.4%	0.3%	0.2%	0.3%	0.2%	0.2%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0.4%	0.4%	0.2%	0.0%
Other	1.1%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	0.9%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.1%	1.0%	1.0%			1.0%	1.0%	1.0%	1.0%

Source: Omdia

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### Exhibit 7: Edge Routing ex-China as a Percentage of the Global Edge Routing Market

The China edge routing market is a more mature market, and spending levels in China weakened with edge routing ex-China increasing to 82.3% of the global core routing market in 3Q23

	1Q19	2Q19	3Q19	4Q19	1Q20	2Q20	3Q20	4Q20	1Q21	2Q21	3Q21	4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23	CY19	CY20	CY21	CY22
	19-Mar	19-Jun	19-Sep	19-Dec	20-Mar	20-Jun	20-Sep	20-Dec	21-Mar	21-Jun	21-Sep	21-Dec	22-Mar	22-Jun	22-Sep	22-Dec	23-Mar	23-Jun	23-Sep	23-Dec				
Edge ex-China as % of Global	74.0%	72.4%	74.1%	73.6%	74.8%	68.2%	74.3%	75.9%	79.7%	75.5%	77.7%	77.0%	80.4%	79.5%	81.0%	82.0%	83.6%	77.2%	82.3%		73.5%	73.3%	77.4%	80.7%

Source: Omdia

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**Stocks mentioned**

Prices and ratings for stocks mentioned in this report

<b>BofA Ticker</b>	<b>Bloomberg ticker</b>	<b>Company name</b>	<b>Price</b>	<b>Rating</b>
<b>CSCO</b>	CSCO US	Cisco Systems	US\$ 49.75	B-2-7
<b>JNPR</b>	JNPR US	Juniper Networks	US\$ 37.12	-6-

Source: BofA Global Research

**Price objective basis & risk****Cisco Systems (CSCO)**

Our \$55 PO is based on roughly 12x EV/FCF using our CY2025 estimate, in-line with tech peers at 9-20x (appropriate given Cisco's stability and high 3.0%+ dividend yield). We also focus on FCF to better capture software revenue growth and the shift to subscription models.

Downside risks to our price objective are: (1) deterioration in the spending environment, (2) lack of growth in public spending, a vertical that Cisco dominates, (3) downside risk to gross margin stemming from pricing and competitive pressures, (4) technological changes that would adversely impact high profit switching and routing segments, (5) inability to drive technological innovation in its core and new growth segments through organic innovation and acquisitions, and (6) change in customer behavior that would result in revenue pressure in services and other key areas.

Upside risks to our price objective are: (1) higher than expected growth in key markets, particularly switching and routing, and (2) solid market share gains in security and observability.

**Juniper Networks (JNPR)**

We have removed the investment opinion on the company's stock. Investors should no longer rely on our previous opinion or price objective.

**Analyst Certification**

I, Tal Liani, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.

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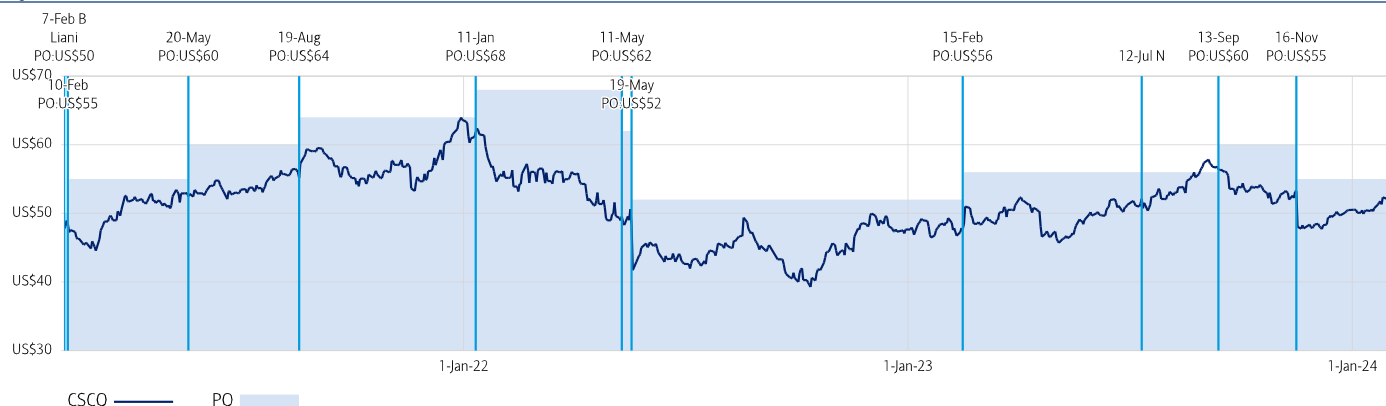
## US - Telecom and Data Networking Equipment Coverage Cluster

Investment rating	Company	BofA Ticker	Bloomberg symbol	Analyst
<b>BUY</b>				
	Akamai	AKAM	AKAM US	Madeline Brooks
	Amdocs	DOX	DOX US	Tal Liani
	Arista Networks	ANET	ANET US	Tal Liani
	Check Point Software Technologies	CHKP	CHKP US	Tal Liani
	Ciena	CIEN	CIEN US	Tal Liani
	CrowdStrike Holdings Inc.	CRWD	CRWD US	Tal Liani
	CyberArk	CYBR	CYBR US	Tal Liani
	Fastly	FSLY	FSLY US	Madeline Brooks
	Fortinet	FTNT	FTNT US	Tal Liani
	Gen Digital, Inc.	GEN	GEN US	Jonathan Eisenson
	InterDigital, Inc.	IDCC	IDCC US	Tal Liani
	Motorola Solutions	MSI	MSI US	Tomer Zilberman
	Qualcomm	QCOM	QCOM US	Tal Liani
	Zscaler	ZS	ZS US	Tal Liani
<b>NEUTRAL</b>				
	Cellebrite	CLBT	CLBT US	Tal Liani
	Cisco Systems	CSCO	CSCO US	Tal Liani
	Palo Alto Networks	PANW	PANW US	Tal Liani
	SentinelOne, Inc.	S	S US	Tal Liani
<b>UNDERPERFORM</b>				
	Cloudflare	NET	NET US	Madeline Brooks
	CommScope	COMM	COMM US	Tal Liani
	F5 Inc	FFIV	FFIV US	Tal Liani
	Okta Inc	OKTA	OKTA US	Madeline Brooks
	SecureWorks	SCWX	SCWX US	Tal Liani

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## Important Disclosures

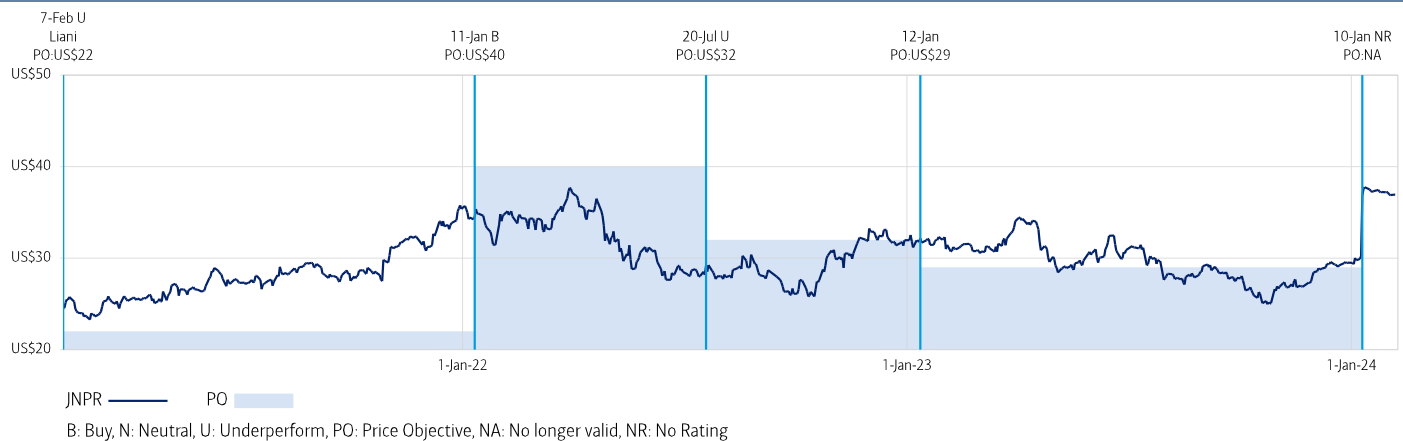
## Cisco Systems (CSCO) Price Chart



B: Buy, N: Neutral, U: Underperform, PO: Price Objective, NA: No longer valid, NR: No Rating

The Investment Opinion System is contained at the end of the report under the heading "Fundamental Equity Opinion Key". Dark grey shading indicates the security is restricted with the opinion suspended. Medium grey shading indicates the security is under review with the opinion withdrawn. Light grey shading indicates the security is not covered. Chart is current as of a date no more than one trading day prior to the date of the report.

## Juniper Networks (JNPR) Price Chart



The Investment Opinion System is contained at the end of the report under the heading "Fundamental Equity Opinion Key". Dark grey shading indicates the security is restricted with the opinion suspended. Medium grey shading indicates the security is under review with the opinion withdrawn. Light grey shading indicates the security is not covered. Chart is current as of a date no more than one trading day prior to the date of the report.

## Equity Investment Rating Distribution: Telecommunications Group (as of 31 Dec 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships <sup>R1</sup>	Count	Percent
Buy	57	51.82%	Buy	43	75.44%
Hold	27	24.55%	Hold	17	62.96%
Sell	26	23.64%	Sell	12	46.15%

## Equity Investment Rating Distribution: Global Group (as of 31 Dec 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships <sup>R1</sup>	Count	Percent
Buy	1895	53.62%	Buy	1083	57.15%
Hold	832	23.54%	Hold	454	54.57%
Sell	807	22.84%	Sell	383	47.46%

<sup>R1</sup> Issuers that were investment banking clients of BofA Securities or one of its affiliates within the past 12 months. For purposes of this Investment Rating Distribution, the coverage universe includes only stocks. A stock rated Neutral is included as a Hold, and a stock rated Underperform is included as a Sell.

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Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster <sup>R2</sup>
Buy	≥ 10%	≤ 70%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

<sup>R2</sup> Ratings dispersions may vary from time to time where BofA Global Research believes it better reflects the investment prospects of stocks in a Coverage Cluster.

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