

should improve over time, or at least move into positive territory. Unfortunately, both the DC and bandwidth segments have reported negative free cash flow every year since 2011, including 2020. The DC segment's FCF in 2020, for instance, was -\$2.9B on a revenue base of \$14.8B. The towers segment has done better than the other two on an FCF basis, reporting \$10.5B in FCF in 2020 on revenues of \$41.2B. However, the towers sector faces significant capital requirements in building out more edge towers and small cells to support 5G; that will put pressure on future FCF margins. Further, tenancy ratios in the towers sector (outside China) have declined in recent years, weakening cash available from operations and ultimately profitability. Getting these tenancy ratios up is a major challenge for tower providers. Crown Castle's market-leading tenancy ratio on its towers suggests that having a complementary fiber network is one way of doing this. But building (or acquiring) such a fiber network is costly. And data center specialists have their own challenges, despite their relatively high FCF margins. There is a need to both build smaller data centers further out to the network's edge, to support 5G, and also to build more hyperscale facilities in the network core to keep up with demand from the web-scalers.

## Private equity investments in CNNO sector will help transform it

Private equity firms have been active in the CNNO market for many years, at least since 1999 when Carlyle helped found Equinix. PE activity in the sector has accelerated over the last few years, though, as more assets have become available due to spinoffs, telcos have begun changing their business models, and the cloud market has exploded. Many funds still focus on making one-off investments and seeking an attractive exit within 2-4 years, as usual. However, PE funds have always been concerned with exploiting potential synergies among firms in their portfolio. Gradually, some are coming to realize that investing in stand-alone CNNOs and working to integrate and scale them into a more comprehensive provider of network assets has real benefits.

Table 1 provides a detailed view of the CNNO investments made recently by key private equity players.

**Table 1: Financial sector's growing support for integrated CNNO business model**

Firm	Group AUM*	Segment	Target	Stake/Investment	Date
Bain Capital	\$130B	DC	ChinData	\$570M	5/2019
		DC	DC BLOX	\$187M	3/2021
		Fiber/BW	Surf Broadband	Majority stake	6/2021
Blackstone	\$619B	DC & Fiber/BW	Ascenty	n/a	6/2017
		DC	21Vianet	\$150M	2020
		DC	15 DCs from COPT	\$558M	2019-20
		DC	Sify (India)	~\$1B	3/2021 rumor
		DC	QTS	~\$10B	6/2021 privatization
		Fiber/BW	Sipartech (France)	n/a	10/2019
		Fiber/BW	Hotwire	n/a	4/2021
		Towers	Phoenix Towers	\$1.4B raised	2/2020
		DC & Fiber/BW	Ascenty	\$613M	9/2018
Brookfield	\$600B	DC	AT&T's DCs, now "Evoque"	\$1.1B	2019
		DC	DCI Data Centers (Australia)	n/a	2019
		Fiber/BW	Various	7/2021: says its portfolio companies own 20K km of fiber	
		Towers	130K towers from Jio	\$375M direct, \$3.7B with GCI et al	12/2019