



PEAKZONE

EDGE COMPUTING REPORT | VENTURE TRENDS

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Edge Computing Venture Report

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About PEAKZONE

Our Venture Experts



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Edge Computing Report



MobilityTech Report



Robotics Report



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Startups we have worked with

Universities and Dealflow Partners

Corporates we have worked with

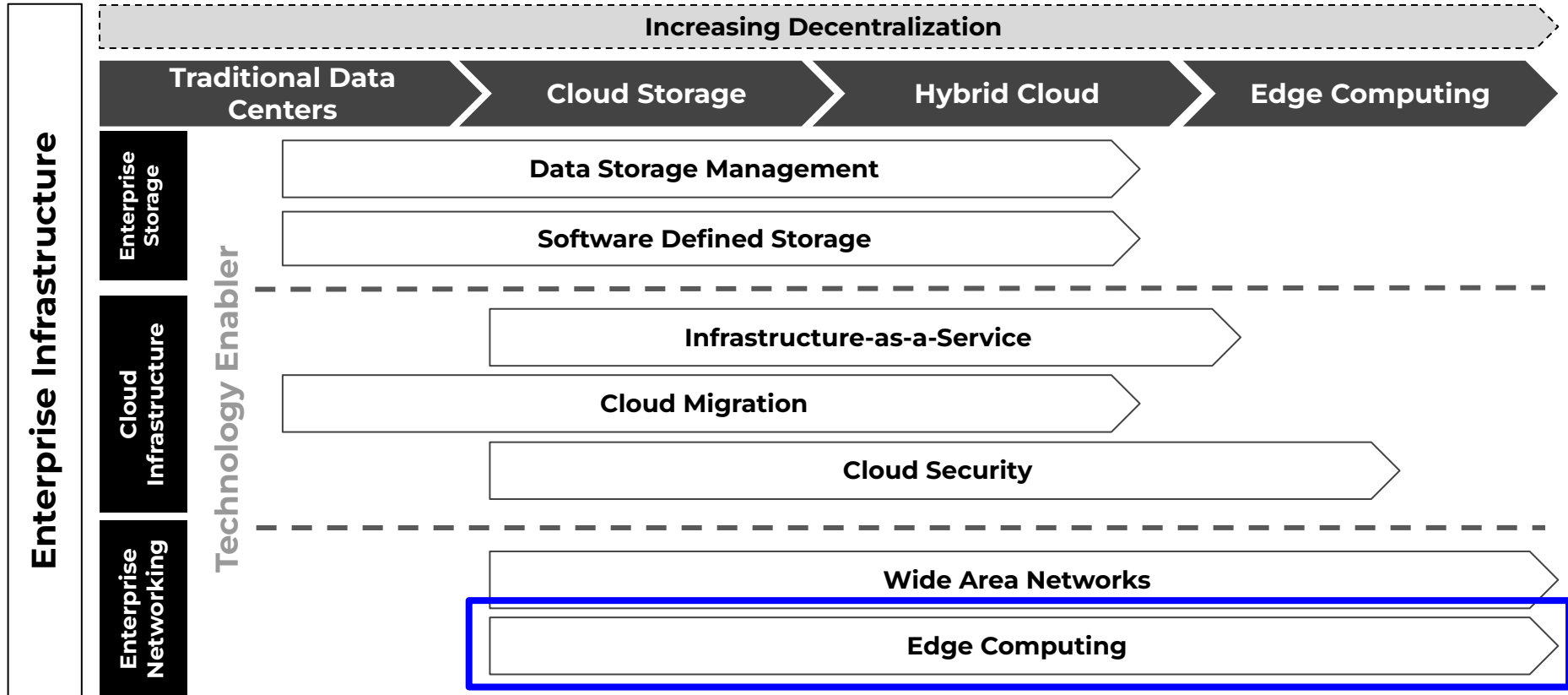
VC Funds that we have worked with



INTRO

Taxonomy
Trends & Drivers
Laws driving Edge Computing
Load Balancing & MEC
Use Cases

Transformation from centralized on-premise data centers to decentralized Edge Computing infrastructures



KEY TRENDS: Edge Computing saves bandwidth, time & money, while offering increased data security

Local & real-time data analysis

Processing data at the source, helps companies make **faster decisions**. This trend is fueled by **optimized hardware** for AI & machine learning as well as open standards & frameworks



Reducing data transfers

Sensors generate **huge amounts of data** that require equal amounts of **bandwidth**. If they are **filtered** at the edge, less data needs to be sent to the cloud. This **saves costs** in transmission & storage



New market entrants

Additionally to big tech players like AWS, Google & Azure, **more and more players** are entering the market, especially from the **cloud computing area**, as edge computing offers many very useful supplementary services



5G Campus Networks

A **local network** for a company campus connects machines, robots, or autonomous vehicles with predictable **data transmission** quality & **low latency**. These networks play a crucial role in advancing smart factories



Security

Sensitive data is only processed on the campus network & **remains protected** within it. Only employees have access to the network & it operates **physically separate** from the public internet, thus it offers **no gateways** for hackers

Key Trends

KEY DRIVERS: The conditions in which edge computers operate form the driving factors & technologies that serve it

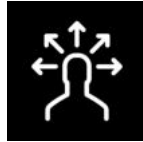
Data Mobility

Edge technologies can operate in places that limit or require connectivity to the cloud for computing, storage, backup, and analytics



Real-time Decision Making

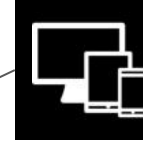
Edge devices & platforms need to be able to do analytics locally, without first sending data to the cloud, so decisions can be made rapidly



Key Drivers

Localized Compute

Edge computers need to be lightweight devices that can make fast, secure decisions without the support of bigger computing power



Storage & Security

As the numbers of sensors generating data grow, so does the need for efficient storage that can be secured in a variety of environments

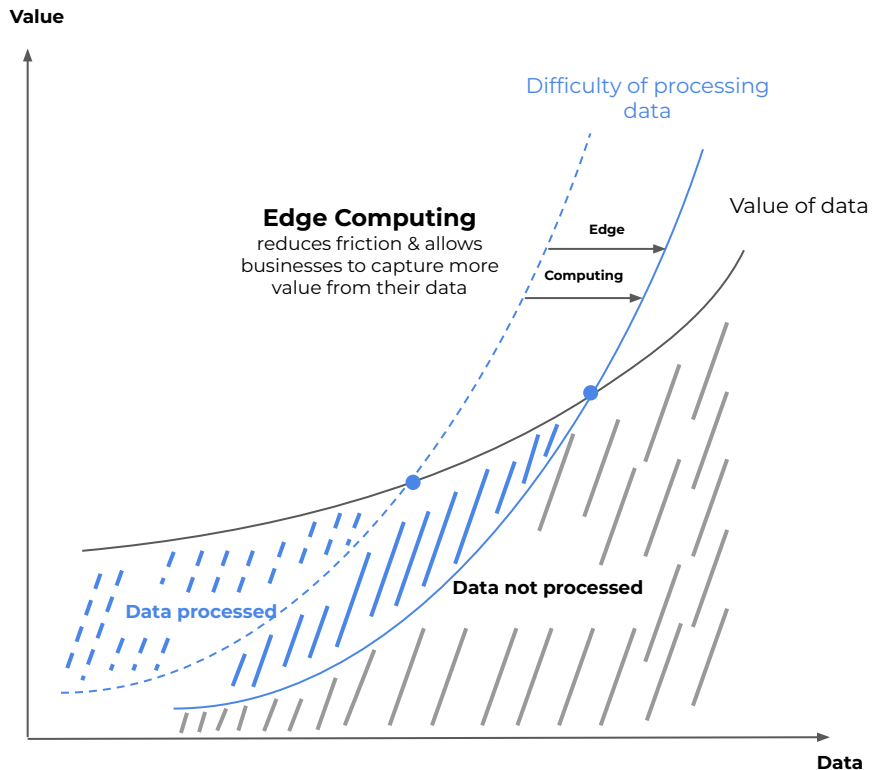


Intermittent Power

Especially in industrial applications, edge computers need to be able to operate with a power supply that might be sporadic (e.g. agriculture, remote areas)



3 reasons why local data processing is important, in addition to cloud-based processing



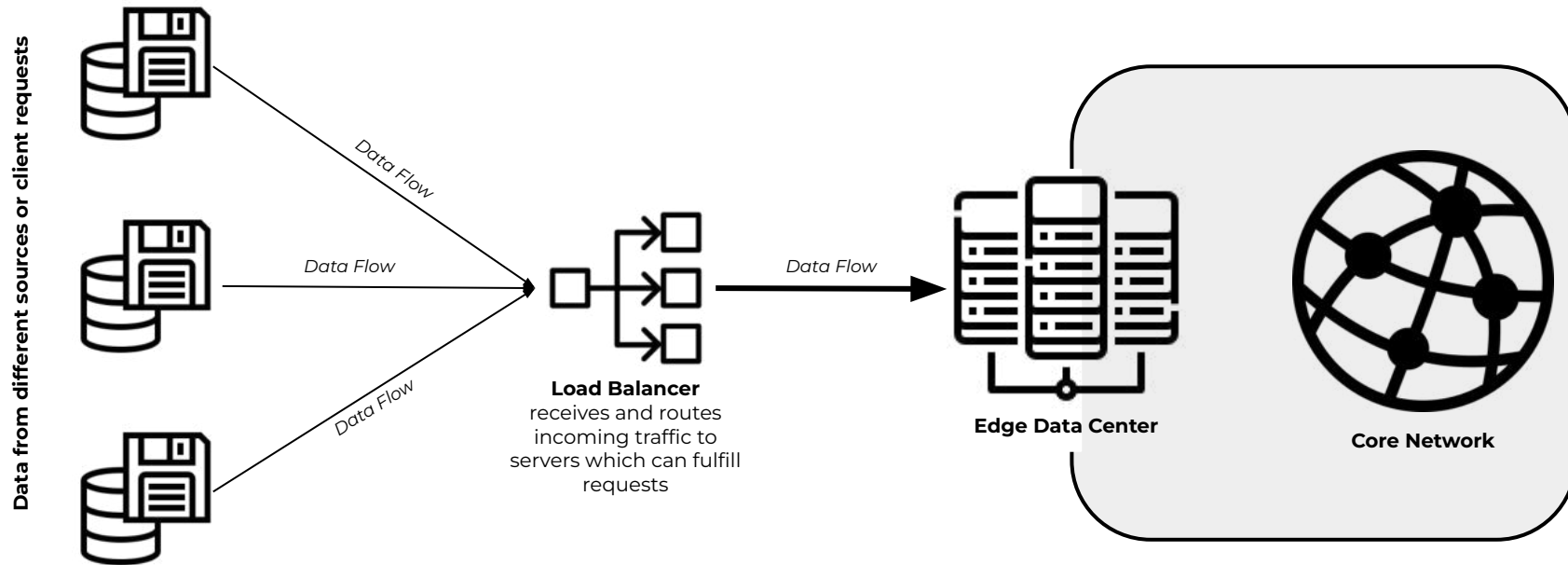
Laws driving Edge Computing

- 1. Law of Physics:** It takes time to send data to the cloud, and networks don't have 100% availability. Physically remote industries, such as mining and agriculture, are more affected by these issues
- 2. Law of Economics:** Data production has grown more quickly than bandwidth, and much of this data is low value. Local aggregation & filtering of data allows customers to send only high-value data to the cloud for storage and analysis
- 3. Law of the Land:** Regulatory requirements to isolate or duplicate data in particular locations. Some governments impose restrictions on where data may be stored & processed

Takeaways

- Data gets more valuable when it can be **processed together with other data**, which is possible in the cloud
- At the same time, it can be valuable to **process data right at the source** where it is generated
- **Applications** like medical equipment & industrial machinery **can't rely on the cloud** for control alone & require some form of **local storage and execution**

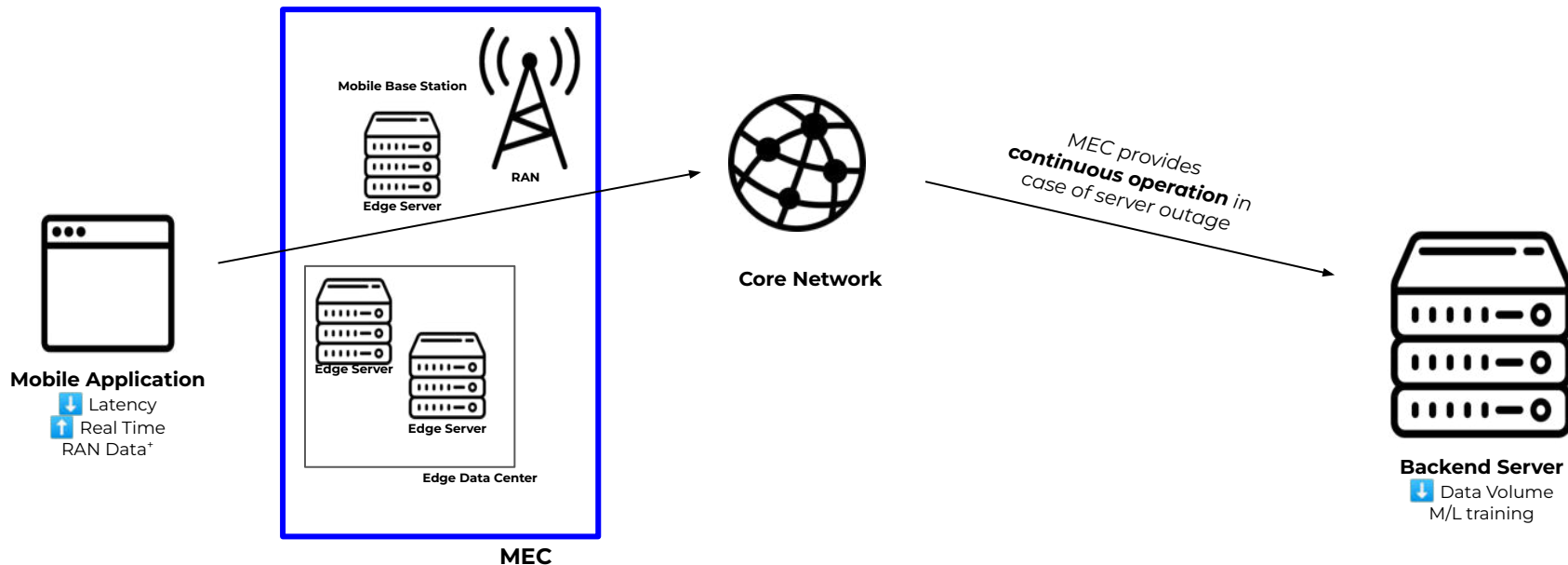
Load balancing plays a crucial role in providing continuous services, prevention of downtimes & low latency



Take-away

- Load balancing is the process by which network or application **traffic is distributed** across multiple servers in a server farm or server pool to ensure that the **load is spread out** and that servers **do not become overloaded**
- Load balancers can be **physical devices** in the network, **virtualized instances** running on specialized hardware, a **software process**, or incorporated into an **application delivery controller** - devices designed to improve application performance & security

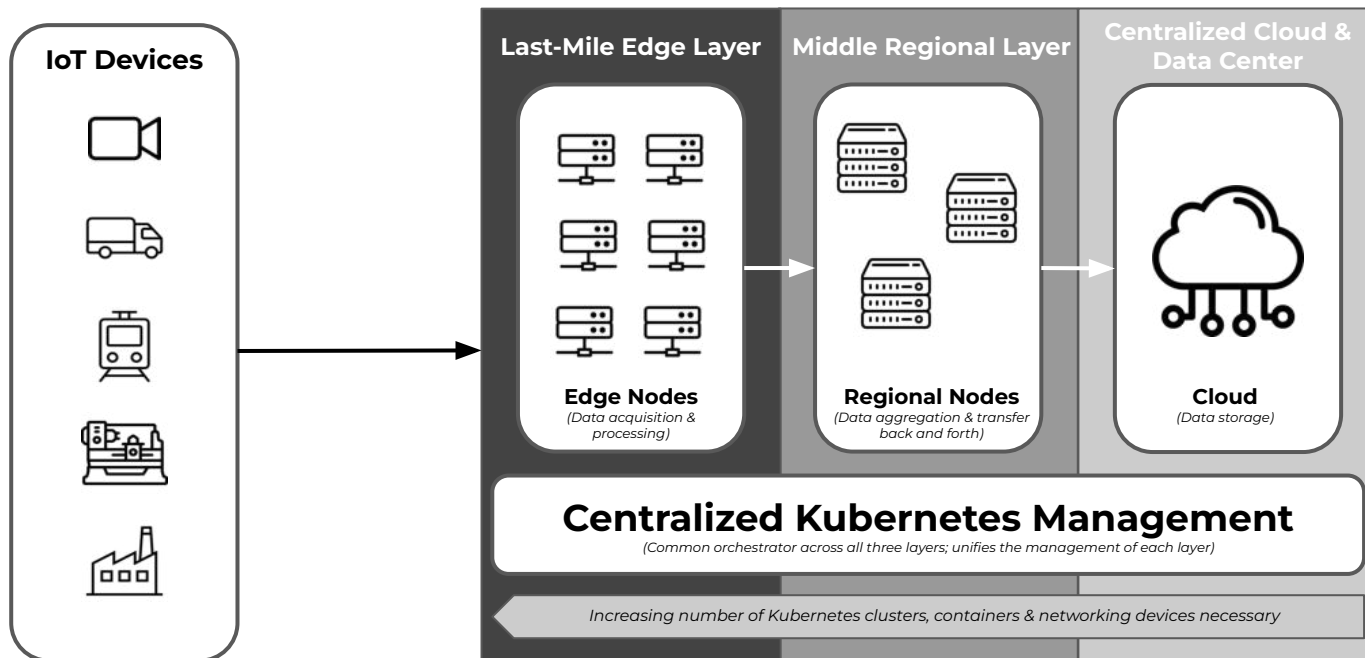
Multi Access Edge Computing (MEC) defines the next logical step in reducing latency & providing continuous operation



Take-away

- MEC brings cloud computing capabilities **closer to the end user** & is widely used in video analytics, location services, augmented reality, local content distribution or data caching, among many others
- MEC reduces latency from **100ms to less than 10ms**; excess capacity in the backend server can be used for **machine learning training** to improve the **accuracy of data processing** at the network's edge
- **Radio Access Network** knows where users are located & **can predict** where **additional load** will be required

Kubernetes is the underlying ‘operating system’ for each of the edge architecture layers



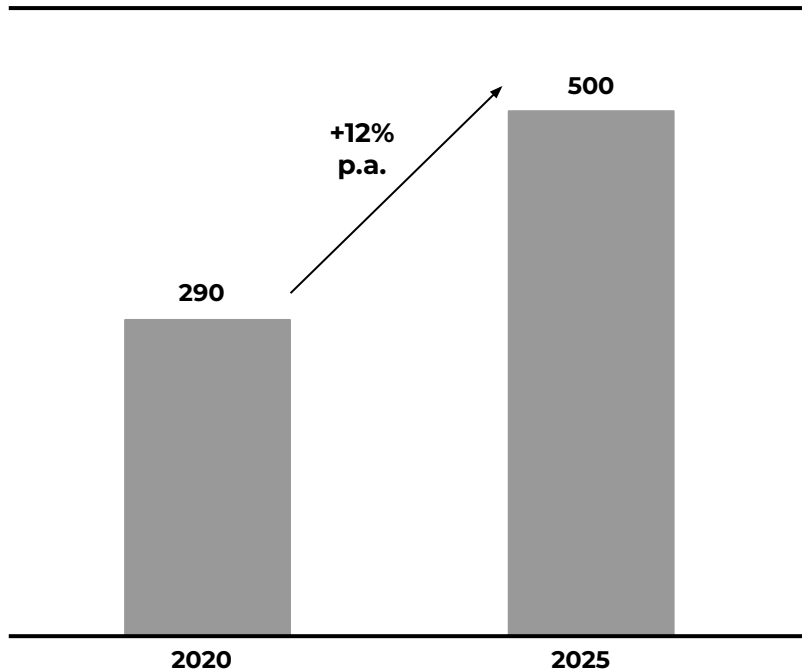
Take-away

- A **typical request** from a connected device to a centralized cloud data center & back can take **as long as 250 ms**, while **at the edge** latencies **under 20 ms** are possible
- **Kubernetes'** cluster-based architecture, and its self-healing capabilities are ideal for **automating, deploying, scaling & managing containerized applications**, needed to power edge nodes

Increasing demand & number of use cases in Industrial IoT is driving the Edge Computing market

Industrial IoT-spending 2020 - 2025

rough estimate by IDC, McKinsey; in \$bn



Important growth drivers

	2000s	2021
Cost of Sensors	Average unit price of \$1.30 per sensor	Unit price per sensor decreased to below \$0.50
Data Storage Cost	Storage of 1 GB costs more than \$500	1 GB can be stored for less than \$0.02
Distribution	IoT-devices are limited to specific applications e.g. security cameras	8.4 Bn IoT-devices are in use; a digital customer owns on average 4 connected devices
Connectivity	2G-Networks with 50 kb/s; wifi & bluetooth are just being introduced	5G-Networks support up to 20 GB/s (400,000x faster); wifi & bluetooth are standard

Over 100 use cases creating >\$200 bn in value within 5-7 years

Travel, Transport & Logistics

	Overview	Computing needs	Edge Computer	Ecosystem	Environment
Autonomous Vehicles	AVs must make instantaneous driving decisions based on data collected via LIDAR, RADAR, or cameras. Once the car returns to the garage, data is offloaded for further analytics	To avoid fatal consequences data must be processed in real-time for immediate decisions to turn, brake, or accelerate	<ul style="list-style-type: none"> Autonomous Vehicle Garage-based data center 	<ul style="list-style-type: none"> AV OEMs & integrators Automotive OEM suppliers LIDAR, RADAR & camera vendors 	Mobile outdoor environment with variations in temperature, vibration and connectivity

Global Energy & Materials

	Overview	Computing needs	Edge Computer	Ecosystem	Environment
Health & Safety in Mining	Sensors on monitoring equipment, in the environment and on employees, generate data that are processed in real time to improve workforce productivity, workplace safety, and operational efficiency	With limited connectivity , data must be processed and acted upon in real time to prevent fatal accidents. The computer must also withstand harsh mining environment	<ul style="list-style-type: none"> Hyperconverged Edge appliance 	<ul style="list-style-type: none"> Mining corporations Hyperconverged solution vendors 	Harsh outdoor and underground environments, with limited or no connectivity

Public Sector & Utilities

	Overview	Computing needs	Edge Computer	Ecosystem	Environment
Water quality monitoring	Sensors with integrated compute are deployed in treatment plants & pipes; data is processed on-site to monitor water quality in real time . Where connectivity is strong, data is sent to the cloud for centralized analytics	In remote settings with no connectivity, information must be processed locally in real time. The edge device must withstand outdoor environments	<ul style="list-style-type: none"> Hyperconverged appliance 	<ul style="list-style-type: none"> State utility companies Electronic equipment manufacturers Hyperconverged solution vendors 	Outdoor environment with varying temperature ranges, and indoor factory environment, such as central water treatment parks

SECTOR ANALYSIS

Edge Computing

Edge Computing Semiconductors

Edge Processing

Edge Cloud

Edge Computing Software

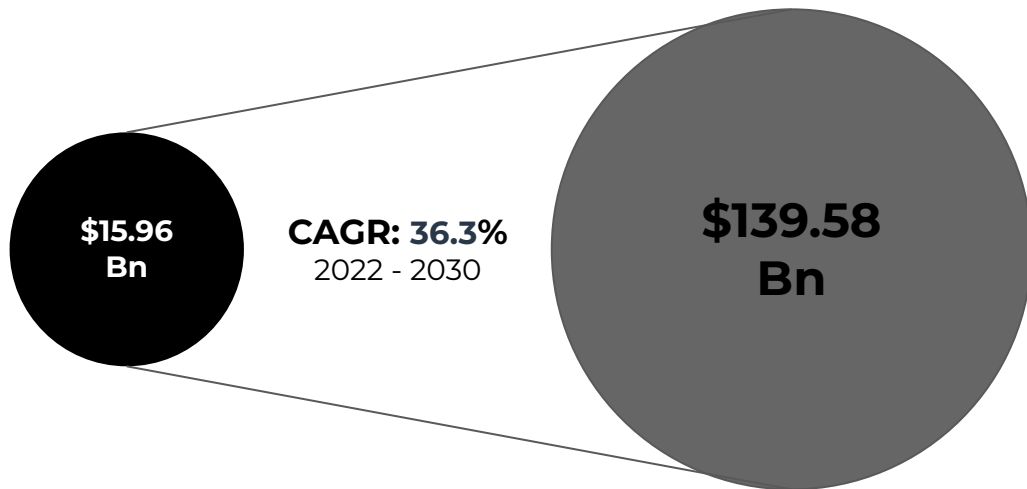
Hyperconverged Infrastructure

Mobile Edge Computing

Edge Application Management

Edge Load Balancing

Edge Computing addresses lower latency, processing huge data loads & supporting resilience to network disconnection



Market Trends

- Increasing data loads on **cloud infrastructure** globally
- Rise in number of **intelligent applications**
- Number of **connected devices** is anticipated to exhibit substantial increase with **5G networks**

Market Driver



Take-away

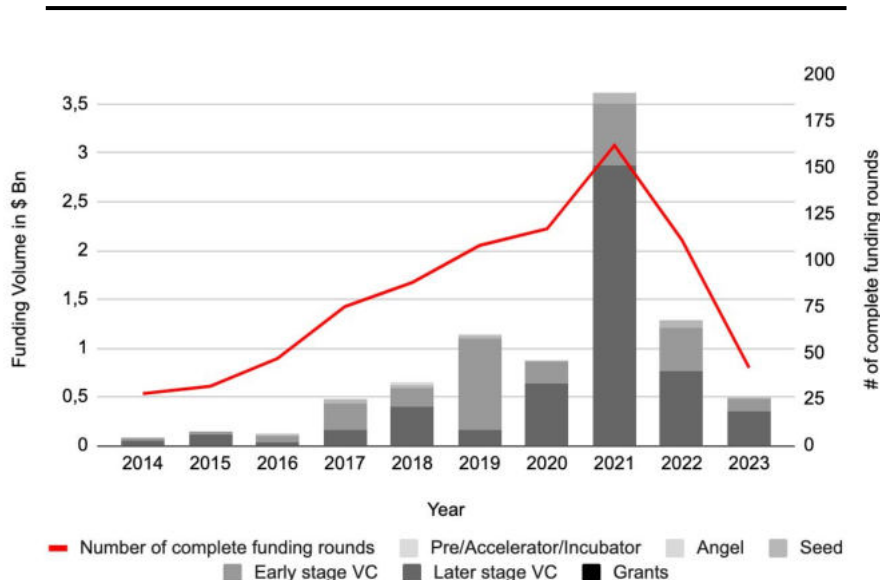
- Edge computing assists **real-time** applications in **analyzing and processing** collected data
- **5G networks** and numerous **frameworks** for **IoT solutions** are expected to provide major **opportunities** for market growth
- These **frameworks** provide **APIs, interfaces, connectivity, network, integration** capabilities & other **management features**
- Market growth is mainly attributed to **increase** in number of **smart devices** and to **saving bandwidth** on transporting unnecessary data from data centers to central cloud platforms



Funding for Processors and AI chips has accelerated venture investments in Edge Computing in recent years

Total funding Edge Computing

Total funding & number of rounds, 2014 - 2023*



Take-away

- **About \$8.89 Bn overall funding** within last 10 years in **810 funding rounds**
- **Median deal size** rose from **\$2.00 Mn in 2020** to over **\$6.5 Mn in 2023** reaching a new record
- **Median Post Valuation** reached a **peak in 2021** at **\$44 Mn** and has since **leveled off at \$33 Mn**
- **2023** has had **\$487 Mn** in funding over **42 rounds** so far, with a majority of funding volume (**\$154.5 Mn**) invested **into BlocPower**, a startup **leveraging edge computing** to reduce carbon emissions and save energy
- Main focus is on **later stage** startups (2023 already \$356.5 Mn investment volume)

Notable Investors

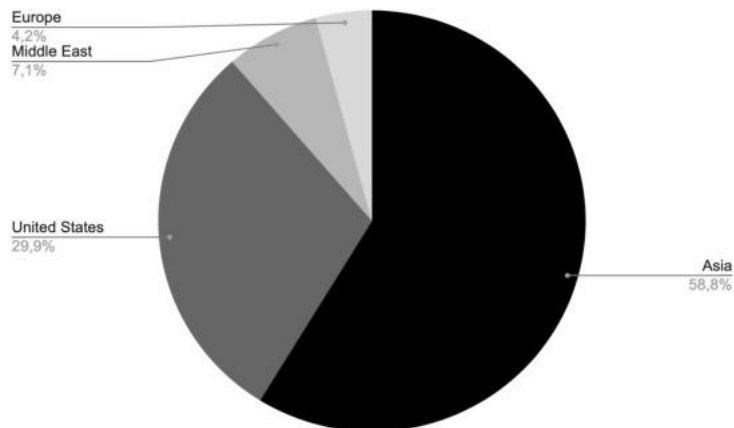
- **Corporates:** Juniper Networks, Microsoft, HPE, Deutsche Telekom, GE, Dell Technologies, GE, Apple, Akamai, Intel, Cisco, Qualcomm, UK Government, European Union
- **Investment Banks:** BlackRock, Deutsche Bank, Goldman Sachs, Societe Generale
- **VC-Funds:** Softbank Vision Fund, Sequoia Capital, Bessemer Ventures, Almi Invest

* As of: 01/07/2021

The APAC region is heavily investing in Edge Computing startups closely followed by the US

Capital Invested by Global Region

by region in %

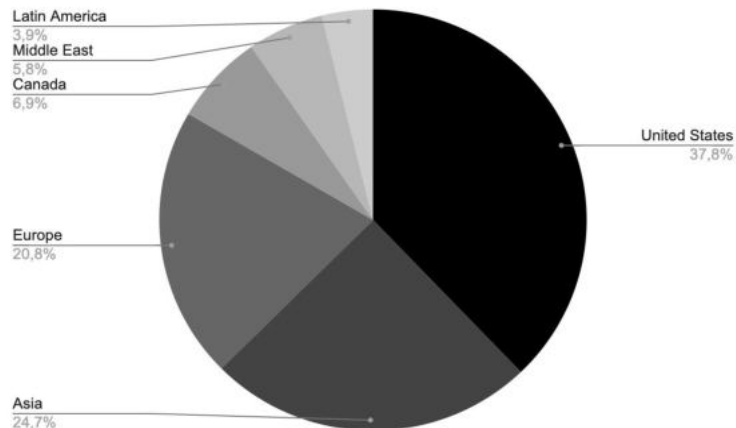


Take-away

- **Asian** companies receiving **majority (58.8%)** of the funding volume
- **Chinese** companies are **receiving a majority of total funding**, due to **early rollout of 5G** networks paving the way for further edge computing efforts
- **UK Government** is investing **strongly** into startups in the UK, especially in **autonomous driving & infrastructure projects** where edge computing is highly needed & relevant - here we saw high **funding growth** in the last years

Company location

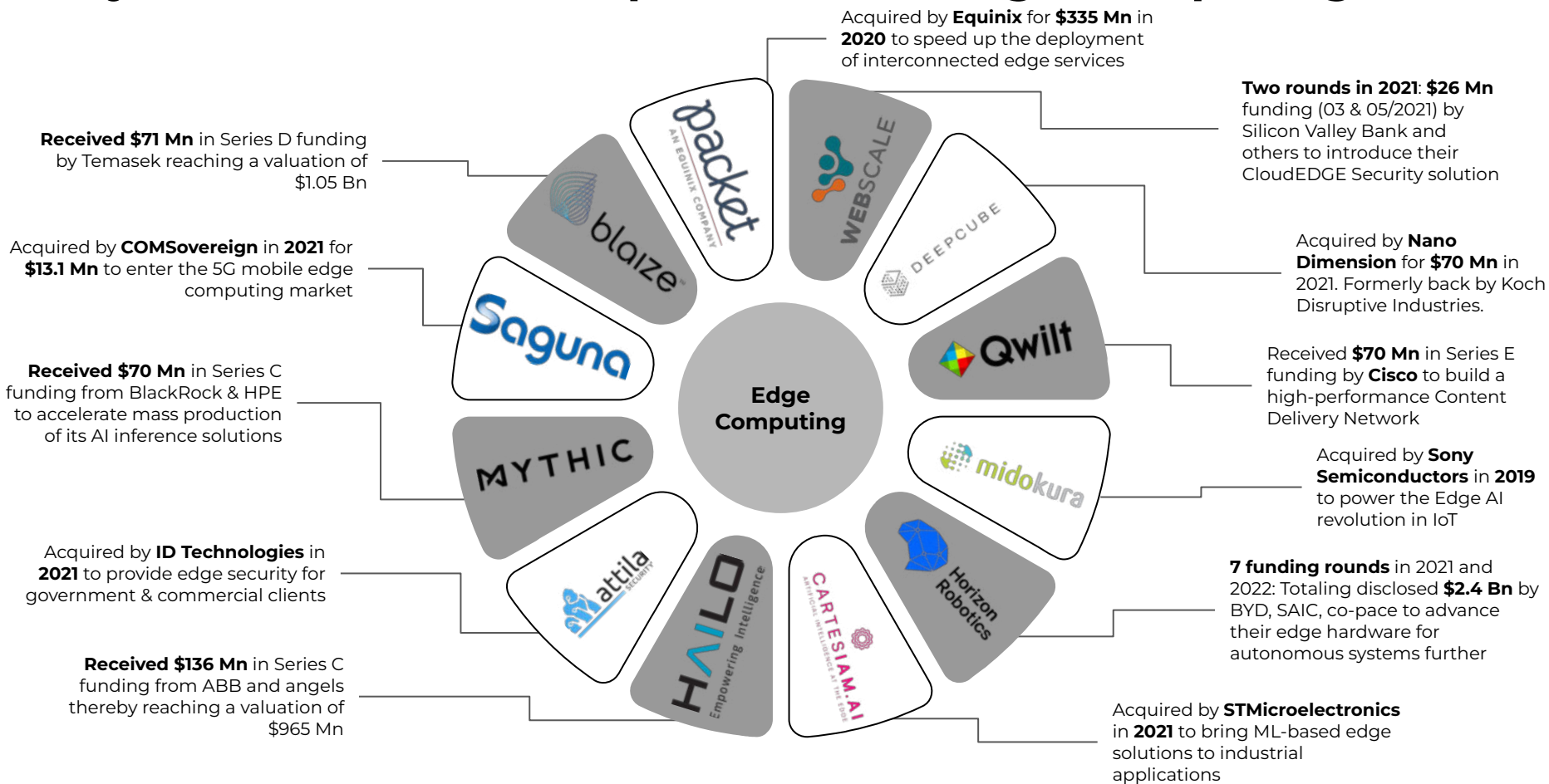
by region in %



Take-away

- Overall there are **429 startups** currently in the Edge Computing market
- Most startups are located in **US**, namely **California**, due to easier access to **funding & big tech players**
- Over **20%** of startups are located in **Europe**, due to high efforts of the **European Commission** to drive digitalization & edge computing
- In **India**, many edge **data centers & 5G networks** are bringing in lots of young talent and new startups to the region

Major investments & acquisitions* in Edge Computing



High company valuations are still rare in Edge Computing as the market is just gaining traction and still in early stages

United States

5



Samba...
\$5.0B



Cloudflare
\$5.1B



Fastly
\$4.3B



NUVIA
\$1.3B



Blaize
\$1.1B

China

5



Horizo...
\$5.0B



ChinD...
\$4.8B



Cambri...
\$3.7B



Moore ...
\$4.3B



C*Cor...
\$1.6B





Take-away

- **Only 10 startups** have reached a **unicorn valuation** in the Edge Computing sector
- Some Companies are **focused on improving content delivery** while others provide **edge colocation** and **infrastructure services**
- The segment with the **highest funding and therefore most unicorns** is specialized **Edge Computing Semiconductors** like processors and accelerator chips - prominent examples are Blaize, Horizon Robotics, Nuvia and Cambricon
- **USA and China are racing to** find, fund and **establish market leader positions** in the edge computing sector

Sector Spotlight

- **Horizon Robotics** has developed **advanced AI processors** and a software platform tailored for applications such as **autonomous vehicles**, smart cities, **robotics**, and surveillance
- They have entered a **strategic partnership with Volkswagen** subsidiary CARIAD to enable autonomous driving in the Chinese market and have raised **over \$2 billion in venture capital**

Big technology players with high efforts in the Edge Computing market

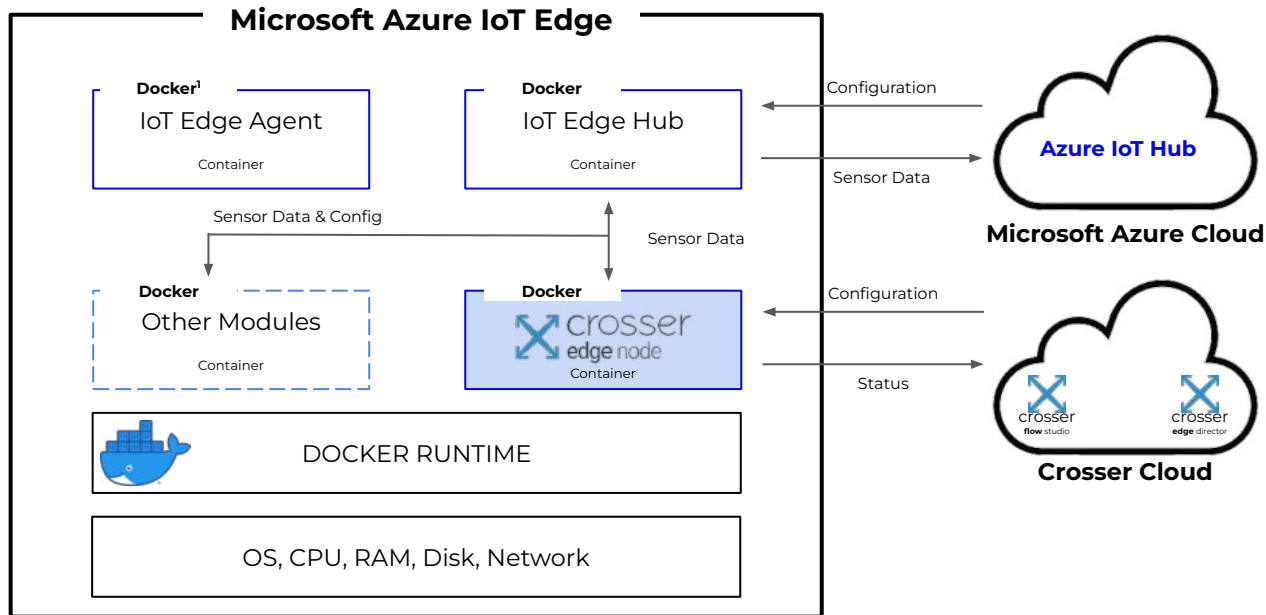
	Strategic Orientation	Key Products & Services	Use Case
	<ul style="list-style-type: none"> • Cloud - Edge combination • Edge Datacenter • Edge Security • Factory Scaling 	<ul style="list-style-type: none"> • AWS IoT Greengrass an open-source edge runtime and cloud service for building, deploying & managing software • AWS supports more security standards & compliance certifications than others 	<p>DTEK uses AWS to prevent power plant equipment failures, gain real-time data access, scale on demand & meet data protection requirements</p>
	<ul style="list-style-type: none"> • Artificial Intelligence • Machine Learning • Cloud - Edge combination 	<ul style="list-style-type: none"> • Building up a multi-access edge solution in a partnership with AT&T • Load balancing through redirecting user request to nearest edge data center • Cloud IoT Edge enables edge devices 	<p>LG CNS uses Google Cloud IoT Edge for enhancing quality & efficiency in their manufacturing divisions, saving millions of dollars yearly</p>
	<ul style="list-style-type: none"> • Cloud - Edge combination • Smart Cities • 5G Networks • Ali-NPU - own AI chips 	<ul style="list-style-type: none"> • Link IoT Edge manages millions of edge nodes providing services at nearest location • Strategically investing in edge computing & combining it with advantages of cloud computing, big data, and AI 	<p>ET City Brain implements video & image recognition to provide intelligent applications for transportation and political & legal affairs for over 20 cities in China</p>
	<ul style="list-style-type: none"> • Edge Processors • 5G Networks • Factory Automation • Artificial Intelligence 	<ul style="list-style-type: none"> • Intel Core vPro, Intel Xeon W-11000E Series, & Intel Celeron built for heavy edge workloads & high bandwidth applications • Intel Movidius™ VPUs supports computer vision and AI workloads 	<p>Siemens Healthineers speed up cardiac MRI segmentation models improving real-time inferencing with Intel® Deep Learning Boost</p>

Many startups engage in strategic partnerships with major players like Google Cloud, AWS or Microsoft Azure

Example: Crosser enhancing existing MS Azure IoT solution



generated data

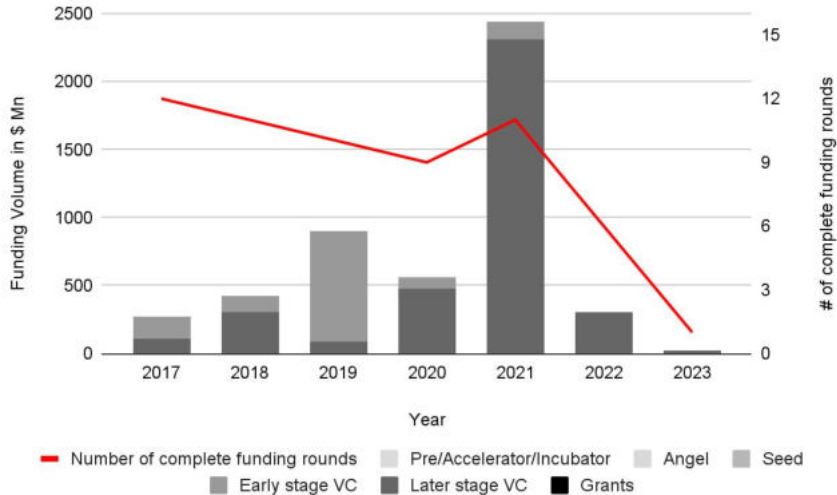


Take-away

- Crosser edge node is deployed as a single **Docker container** and can **run on any platform** that supports Docker, while Azure IoT edge solution **provides deployment & management** of Docker containers
- Crosser-Azure **edge combination** brings several benefits, like **quick & easy building** of advanced Industrial IoT applications, faster **POCs & Time-to-Market** and reducing **Total Cost of Ownership**

Edge Computing Semiconductor

Startups are pioneering advanced AI-driven microchips that enable innovation throughout IoT application cases



of Companies
total / funded

21 / 18

of Acquisitions

1

of IPOs

2

Investment Volume
last 24 months

\$2.3 Bn

Notable Corporates:

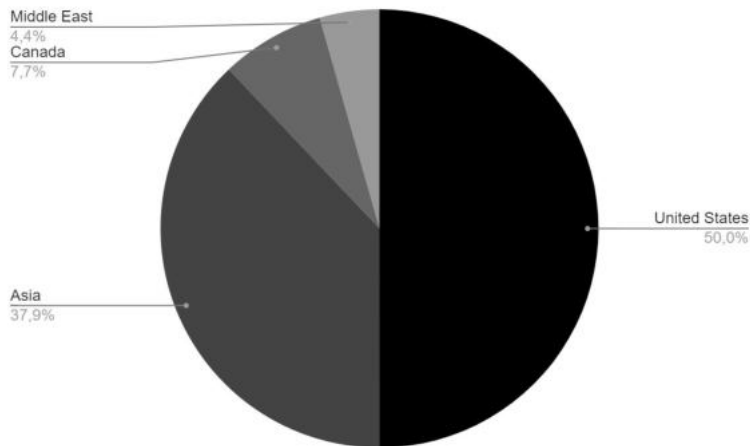
Notable Exits:

Notable Investors:

USA and China are competing to fund the best Edge Computing Semiconductor startups

Capital Invested by Global Region

by region in %



Top 10 Venture Rounds

by Funding Amount

Startup Name	Funding in Mn	HQ Location
SambaNova Systems	\$676.00	USA
Horizon Robotics	\$600.00	China
Horizon Robotics	\$400.00	China
Horizon Robotics	\$350.00	China
Horizon Robotics	\$300.00	China
SambaNova Systems	\$250.00	USA
Tenstorrent	\$200.00	Canada
Ambiq	\$194.08	USA
Horizon Robotics	\$150.00	China
SambaNova Systems	\$150.00	USA

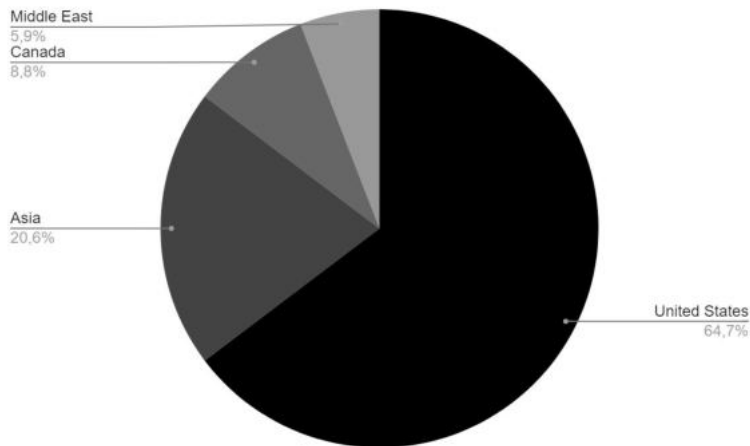
Take-away

- The **USA** and **Asia** have a clear **dominance** in the capital invested in Edge Computing software in recent years, with **SambaNova Systems** and **Horizon Robotics** being two **unicorns** that account for **8 out of the top 10 funding rounds** in the industry, with a combined value of nearly **\$2.9 billion**.

Investors want to capitalize off the demand for edge applications & the need for semiconductors that enable them

Deal Count by Global Region

by region in %



Take-away

- The **USA positions itself as a clear leader** in the number of deals made in the field of Edge Computing software. Involved in this are not only traditional **VC funds like Lux Capital** but also **corporates like Intel** and **government organizations like the United States Air Force**.

Top 10 Investors

by Deal Count

Investor Name	Deal Count	HQ Location
Lux Capital	9	USA
Eclipse Ventures	8	USA
Intel Capital	8	USA
Celesta Capital	5	USA
Huron River Ventures	5	USA
Mercury Fund	5	USA
Michigan Capital Network Ventures	5	USA
Atlantic Bridge	4	Ireland
DCVC	4	USA
Gil Agmon	4	Israel



Hailo

Search Field	Neural Learning Processors
Location	Tel Aviv, IL
Year Founded	2017
Funding in \$ Mn.	\$221.17 Mn
Last Round & Stage	\$100 Mn Series C (07.2021)
Investor	Asi Shmeltzer, Rakefet Russak-Aminoach, OurCrowd, NEC, ABB,
Website	blaize.com

Business Overview

- Processors can be **embedded into devices** and they comprise an architecture that enables edge devices to **run deep learning applications** instead of using the cloud
- Includes **real-time** operation, reduced **power consumption**, as well as a **software development** kit co-developed with the hardware

Use case & partners

- Used in the automotive industry, smart cities, drones, **AR & VR** applications
- Received a grant from the **European Research & Innovation program**
- Partnering with **Macnica**, a semiconductor producer, to expand in the **Japanese market**

Similar Companies

- Habana** (2016, Acquired (\$2 Bn), Intel)
- Horizon Robotics** (2015, Series C (\$3.1 Bn), Sequoia Capital, Intel Capital)

Business Overview

- Analog techniques for **signal processing** & neural networks **reduce** number of **transistors** required
- Performs calculations inside a **dense flash-memory** array, which allows **parallel processing** capabilities
- Delivers hardware, software tool kit & trained neural networks to **ease deployment** in edge devices

Use case & partners

- Used in **Smart Cities, ADAS & Autonomous Driving**, and in **Robotics**
- Spin-off from **University of Michigan**
- Recent funding round to be used for **mass producing** microchips & developing **more hardware & software products**

Similar Companies

- Arm** (1990, Acquired (\$40 Bn), NVIDIA)
- Graphcore** (2016, Series E (\$767 Mn), Sequoia Capital, Dell Technologies, Microsoft, Robert Bosch VC, Samsung Catalyst, Atomico)

Mythic

Search Field	AI Microchips
Location	Austin, US
Year Founded	2012
Funding in \$ Mn.	\$177.41 Mn
Last Round & Stage	\$20.49 Mn Later Stage VC (02.2023)
Investor	BlackRock, DFJ, HPE, Lockheed Martin, Softbank Ventures, Future Ventures
Website	mythic-ai.com



Blaize

Search Field	Graph Streaming Processor
Location	El Dorado Hills, US
Year Founded	2010
Funding in \$ Mn.	\$136 Mn
Last Round & Stage	\$71 Mn Series D (07.2021)
Investor	Temasek, Denso, Franklin Templeton, Daimler, Samsung Catalyst, Magna
Website	blaize.com

Business Overview

- Fully programmable **100% graph-native** processor architecture & software platform
- Graph-native means developers can build **multiple neural networks** & entire **workflows** for neural networks on a **single architecture**
- Build entire AI applications **faster, optimise** for edge deployment & run them **efficiently** using **automated** data-streaming methods

Use case & partners

- Used in the **automotive industry** for smart vision systems and in autonomous driving & in **enterprise infrastructure** in robotics
- Partnered with **Samsung & TSMC** to build their GSP chips on Samsung's **14nm process technology**

Similar Companies

- **Hailo** (2017, Series C (\$198 Mn), NEC, ABB Technology, OurCrowd)
- **Horizon Robotics** (2015, Series C (\$3.1 Bn), Sequoia Capital, Intel Capital)

Business Overview

- Syntiant brings AI and machine learning to edge devices.
- Their chip solutions combine deep learning and semiconductor design.
- Syntiant focuses on deep neural network processor

Use case & partners

- These solutions allow original design manufacturers (ODMs) to easily and rapidly incorporate intelligence into various devices.
- The intelligence is added for always-on voice, sensor, and image applications.

Similar Companies

- **Ambiq** (2022, Undisclosed (\$0,11 Mn), EDBI, Kleiner Perkins)
- **Brite Semiconductor** (2022, IPO)

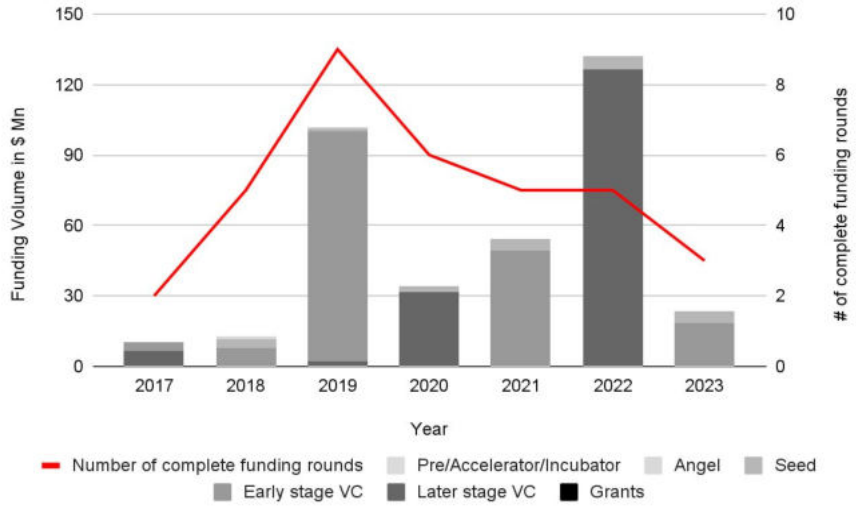
Syntiant

Search Field	Neural Network Processors
Location	Irvine , US
Year Founded	2017
Funding in \$ Mn.	\$120.06 Mn
Last Round & Stage	\$55 Mn Series C (03.2022)
Investor	Horowitz Group, M12 Lab, Bosch Ventures, Atlantic Bridge Capital
Website	syntiant.com



— Edge Processing —

Processing capabilities at the edge attract Corporate investors from the automotive and industrial manufacturing industries



of Companies total / funded
19 / 12

of Acquisitions
0

of IPOs
0

Investment Volume last 24 months
\$160 Mn

Notable Corporates:

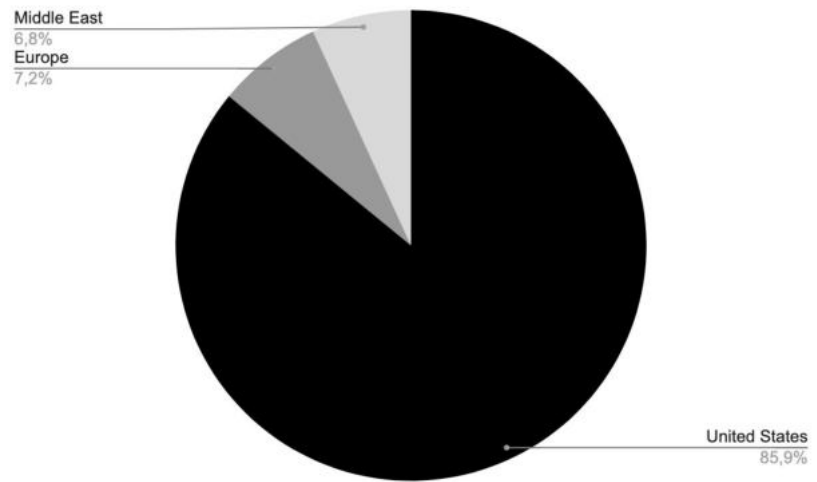
Notable Exits:

Notable Investors:

Strategic partnerships and investments by corporates are strongly driving funding volume

Capital Invested by Global Region

by region in %



Top 10 Venture Rounds

by Funding Amount

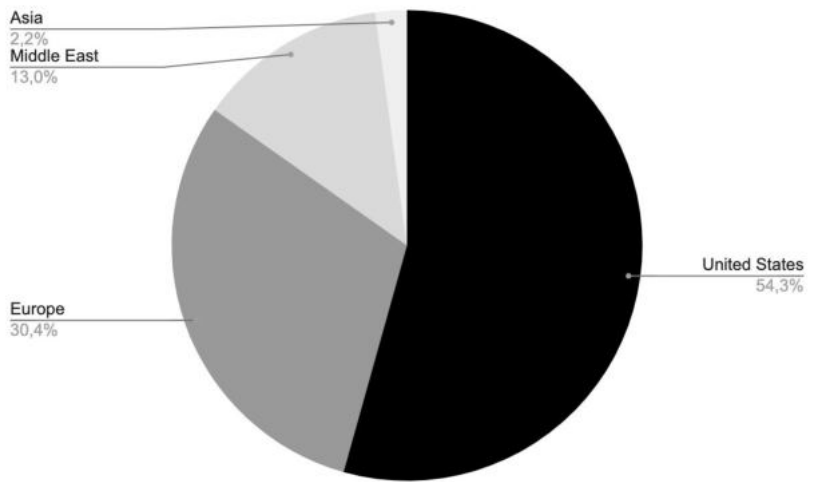
Startup Name	Funding in Mn	HQ Location
Alif Semiconductor	\$115.00	USA
Alif Semiconductor	\$50.00	USA
Recogni	\$48.90	USA
Recogni	\$25.00	USA
Alif Semiconductor	\$22.45	USA
MatrixSpace	\$18.55	USA
Eta Compute	\$12.50	USA
Overwatch Imaging	\$11.15	USA
Teraki	\$11.00	Germany
Vocal Zoom	\$9.16	Israel

Take-away

- Founded in **2019**, **Alif Semiconductor** has been able to **raise over \$180 million** in venture capital from well known VC firm **Kleiner Perkins** to **connect** and **secure low-power high-performance edge processing** tools. By combining hardware acceleration, smart MEMS IMU sensing, and a development platform for machine learning, **Alif, Bosch and Edge Impulse** have **simplified the creation of edge sensing applications** that classify complex motions and identify gestures.

IoT and Autonomous Driving use cases make startups attractive investment targets for CVC units

Deal Count by Global Region
by region in %



Take-away

- Edge Processing has **application cases in autonomous driving** and perception systems which makes **startups** in this segment **attractive investments for CVC arms** of car manufacturers and tier 1 suppliers. **BMW, Toyota, Continental and OSRAM** are **actively investing** in the space. But also **CVCs from other industries** are scouting for the best solutions in the market such as **3M, Intel and Deutsche Telekom**.

Top 10 Investors
by Deal Count

Investor Name	Deal Count	HQ Location
OurCrowd	5	Israel
Celesta Capital	4	USA
3M Ventures	3	USA
Horizons Ventures	3	Hong Kong
Motorola Solutions Venture Capital	3	USA
Radiant Ventures	3	Hong Kong
BMW i Ventures	2	Germany
Fluxunit (OSRAM)	2	Germany
hubraum (Deutsche Telekom)	2	Germany
Intel Capital	2	USA

Recogni

Search Field	AI-powered Perception Chips
Location	San Jose, USA
Year Founded	2017
Funding in \$ Mn.	\$73.9 Mn
Last Round & Stage	\$48.9 Mn Series B (02.2021)
Investor	BMW i Ventures, Toyota Ventures, Robert Bosch Venture Capital, Continental
Website	recogni.com

Business Overview

- Enabling **real-time object recognition** for self-driving cars
- Develops **visual perception platform**, purpose built for autonomous vehicles, allowing vehicles to **detect small objects** at **long distances**, make **driving decisions faster** than humans with **minimal battery power**

Use case & partners

- Used in **autonomous** driving, drones & robots
- OEMs **will** have **perception capabilities** for **any level of autonomy**
- Enabling **chips** from **Continental** to perform **100 times better** through **cooperation**
- Partnering with **BMW, Toyota & Continental**

Similar Companies

- **Cortica** (2007, Series C (\$20 Mn), Horizon Ventures, GEM Asset Management)
- **BlinkAI** (2018, Seed (\$2.4 Mn), Plug and Play, MIT Startup Exchange)

Business Overview

- Helps **build, train and improve** sensor-data driven AI-models
- Increases the **accuracy rate** of AI-models by an additional 10-30%
- Application runs **10x faster** and consumes **10x less power**
- Achieves **4x -10x less data** needed to train algorithms

Use case & partners

- Used in **Autonomous Driving** model training for safer driving & 20% less insurance premium cost
- Offers **battery** energy consumption & lifetime **improvements**
- **Partners** include Infineon, NXP & Microsoft

Similar Companies

- **Cartesiam** (2016, Acquired (Undisclosed), STMicroelectronics)
- **FogHorn** (2014, Series C (\$72.5 Mn), Intel Capital, GE Ventures, Dell, Plug and Play)

Teraki

Search Field	Edge Processing Platform for Automotive Industry
Location	Berlin, DE
Year Founded	2014
Funding in \$ Mn.	\$16.3 Mn
Last Round & Stage	\$11 Mn Series A (12.2019)
Investor	Horizons Ventures, Airbus Biz Lab, Innogy Ventures, Hubraum, MobilityFund
Website	teraki.com

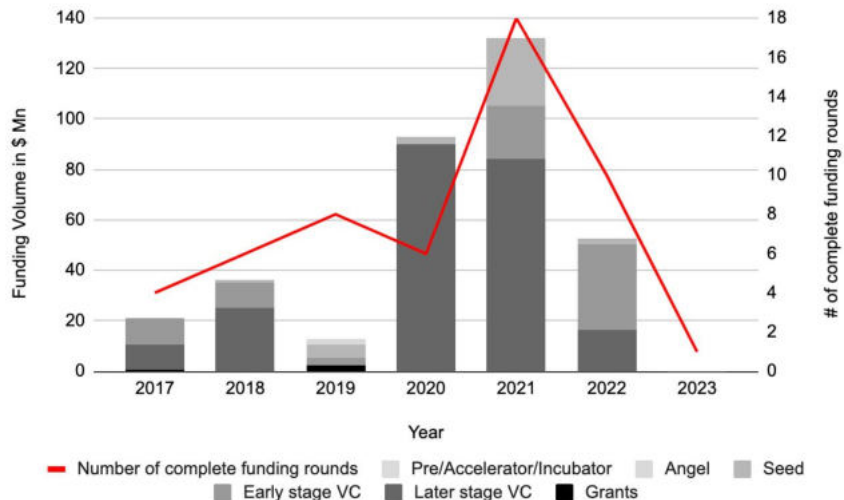
Edge
Processing

Edge
Processing

Edge Cloud



The Edge Cloud market is still in its early stages, and as the technology matures, we may see an increase in startups



of Companies
total / funded

38 / 28

of Acquisitions

4

of IPOs

0

Investment Volume
last 24 months

\$153 Mn

Notable Corporates:



Qualcomm



Notable Exits:

NeoKarm

Acquired (undisclosed)
by Zadara
02/2021

SAGUNA

Acquired (\$13.1 Mn)
by ComSovereign
08/2021

Notable Investors:

Battery

KLEINER PERKINS

SoftBank

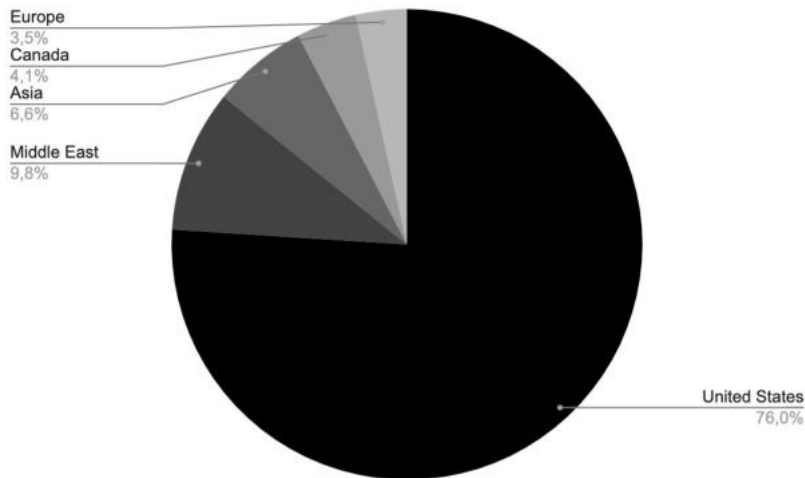
Accel

Bessemer
Venture
Partners

Especially Qwilt, one of the top funded startups, has established itself as market leader in the edge cloud segment

Capital Invested by Global Region

by region in %



Top 10 Venture Rounds

by Funding Amount

Startup Name	Funding in Mn	HQ Location
Vapor	\$90.00	USA
Qwilt	\$70.00	USA
Qwilt	\$25.00	USA
Zadara	\$25.00	USA
Ridge	\$22.00	Israel
Qwilt	\$18.10	USA
EDJX	\$16.74	USA
Scientree	\$15.61	China
Qwilt	\$15.00	USA
Mimik	\$14.30	Canada

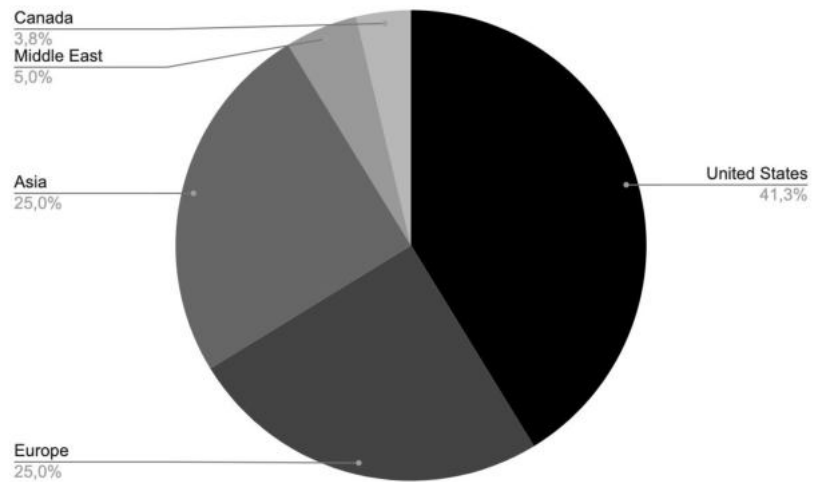
Take-away

- The need for **significant upfront investment** and **infrastructure deployment** can be a **barrier for startups**. It often involves **deploying distributed edge nodes**, **establishing partnerships** with network providers, & investing in **high-performance networking equipment**
- Edge Clouds find **use cases in autonomous driving, smart cities, industrial automation, IoT and video streaming**

The limited number of success stories or industry-leading Edge Cloud startups results in caution from investors

Deal Count by Global Region

by region in %



Take-away

- Top investors including **Accel**, **Bessemer Venture Partners** and **corporate VC arm Cisco Investments** are involved in finding attractive venture opportunities in the segment
- In **Europe** the **European Commission**, **Horizon 2020** and **Innovate UK** are driving **many smaller investments** in Edge Cloud startups

Top 10 Investors

by Deal Count

Investor Name	Deal Count	HQ Location
Accel	4	USA
Redpoint Ventures	4	USA
Marker	3	USA
Mayfield Fund	3	USA
NFX	3	USA
Shunwei Capital	3	China
Slow Ventures	3	USA
Viola Ventures	3	Israel
Bessemer Venture Partners	2	USA
Cisco Investments	2	USA

Qwilt

Search Field	Edge Cloud
Location	Redwood City, US
Year Founded	2010
Funding in \$ Mn.	\$137.20 Mn
Last Round & Stage	\$70 Mn Series E (09.2021)
Investor	Bessemer Venture Partners, Cisco, Accel, Redpoint Ventures, and others
Website	qwilt.com



Edge Cloud

Business Overview

- **Software-based** edge delivery nodes deliver both service provider-owned & third party content
- **Cloud-based** Open API to commercial CDNs & publishers serves as a single point of integration for access to Open Edge Cloud infrastructure
- **Centralized management** & control plane orchestrates dynamic assignment of edge cloud resources for content delivery

Use case & partners

- Used in **video streaming, gaming & VR** at the mobile network edge
- Partnering with **Cisco & Verizon** for building the **largest content delivery network**, by deeply embedding edge nodes in the service provider's last mile network

Similar Companies

- **Theta Network** (2016, \$137.41 Mn (Later Stage VC), Samsung Next, Greycroft)
- **Gigamon** (2004, \$738.94 Mn (Debt), KKR, Qatar Investment Authority, LBO (2017))

Business Overview

- Continuously **reconfigures delivery networks** to ensure workloads are running in optimal locations to meet **real-time traffic** demands
- Empowers DevOps teams to **run Node.js applications** at the network edge for fast results with enterprise level **protection**
- Visualize how **traffic is flowing** through edge architecture, delivering valuable insights

Use case & partners

- Delivering **faster & more secure** digital experiences at the edge
- Empowers **application engineers** to run any workload, anywhere
- Partnering with **DigitalOcean** to offer edge solutions to SMEs

Similar Companies

- **Fastly** (2011, IPO (05/2019))
- **Kwirc** (2012, Acquired (Undisclosed), Instart Logic)

Section.io

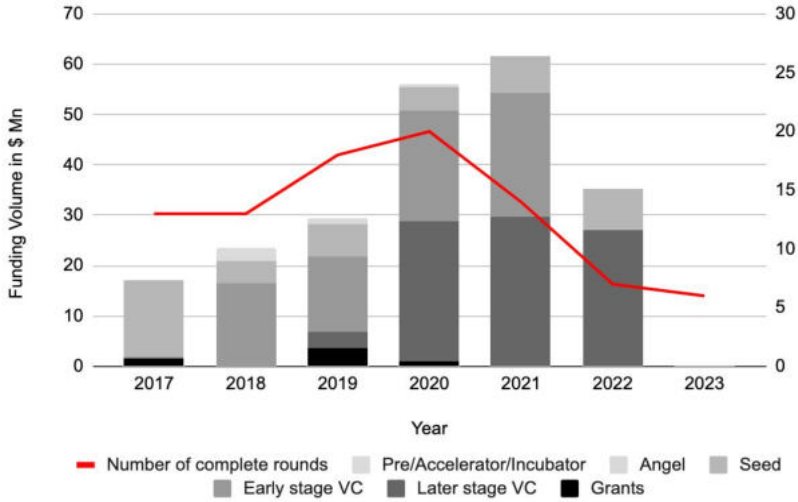
Search Field	Edge-as-a-Service provider
Location	Boulder, US
Year Founded	2012
Funding in \$ Mn.	\$23.65 Mn
Last Round & Stage	\$12 Mn Series B (04.2021)
Investor	Techstars, Lumen, Foundry Group, Galvanize, Government of Australia, Boom Startup
Website	section.io



Edge Cloud

Edge Computing Software

While most startups in the segment are still in early stages, several are reaching maturity and raising large rounds



of Companies total / funded
51 / 10

of Acquisitions
1

of IPOs
1

Investment Volume last 24 months
\$96.9 Mn

Only 20% of startups are funded with a majority of investment rounds undisclosed. This makes it difficult to assess the segment's venture dynamic.

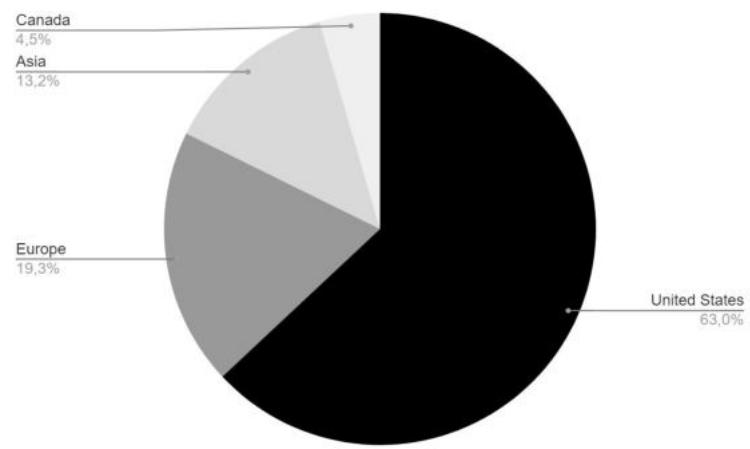
Notable Corporates:

Notable Exits:

Notable Investors:

The rising IoT trend creates demand for software that can process & analyze data in real time at the network edge

Capital Invested by Global Region
by region in %



Top 10 Venture Rounds
by Funding Amount

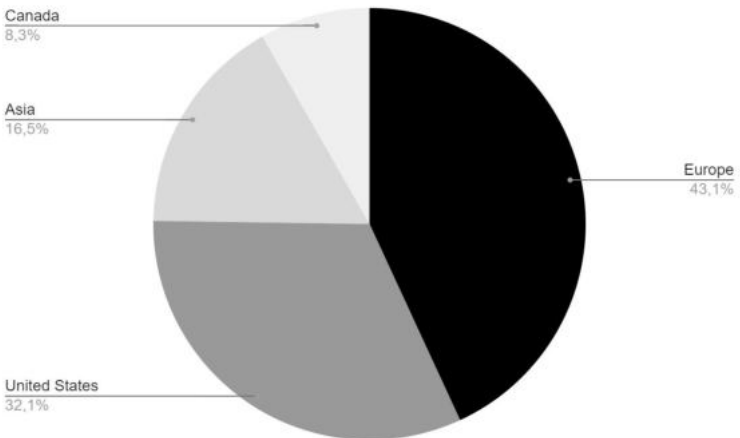
Startup Name	Funding in Mn	HQ Location
Fly.io	\$70.00	USA
Vantiq	\$27.75	India
Fly.io	\$25.00	USA
Vantiq	\$16.60	USA
vdncloud.com	\$14.31	China
Fly.io	\$11.99	USA
EdgeCortix	\$10.00	Japan
Vantiq	\$9.50	USA
Vantiq	\$9.00	USA
IOTech	\$7.63	UK

Take-away

- **Vantiq** enables the **development** and deployment of **real-time, event-driven applications**, while **Fly.io** provides a platform for **deploying applications at the network edge** to enhance performance and reduce latency for end-users
- Both startups offer solutions that **address specific needs in software development** and deployment, leveraging technologies that cater to **real-time data processing** and edge computing requirements

Corporates are looking to secure early partnerships with leading edge computing software startups

Deal Count by Global Region
by region in %



Top 10 Investors
by Deal Count

Investor Name	Deal Count	HQ Location
Dell Technologies	5	USA
Plug and Play Tech Center	5	USA
The MAD Lab	5	Austria
Almi Invest	3	Sweden
Intel Capital	3	USA
Norrlandsfonden	3	Sweden
Spintop Venture	3	Sweden
Techstars	3	USA
Y Combinator	3	USA
Andreessen Horowitz	2	USA

Take-away

- The **Edge Computing Software** segment is **still in** its very **early stages** as can be seen by the **large number of accelerators investing** here
- Especially corporates active in IoT and networking including **Dell, Intel, Bosch, Akamai, and Samsung** are investing in the segment

ClearBlade

Search Field	Edge Computing Platform
Location	Austin, US
Year Founded	2007
Funding in \$ Mn.	\$17.20 Mn
Last Round & Stage	Undisclosed Later Stage VC (11.2022)
Investor	Corsa Ventures, Capital Factory, Align Capital Partners, Equipo Ventures
Website	clearblade.com

Business Overview

- Enables companies to ingest, analyze, adapt and **act on any data in real-time & at scale**
- **Fully extensible** with a suite of proven components and integrations to deliver solutions quickly
- Leverages **local compute, AI & actionable visualizations** while integrating with any enterprise system

Use case & partners

- Technology **collaboration** with **Google Cloud** for edge data integration
- **ClearBlade Intelligent Assets** released integration **support for IBM Maximo** and is also **available on Google Cloud Marketplace**

Similar Companies

- **Payzerware** (2012, Series D (\$23 Mn), Habert Management, Grotech Ventures)
- **Losant** (2015, Series B (\$19.5 Mn), Cincy Tech, Revolution, Techstars, TechNexus)

Business Overview

- **Collecting, processing & integrating** data from multiple different devices at the edge
- Offers an open-source platform for building edge applications that enables workloads to be **processed** at the edge, providing **real-time** decision-making & reducing IoT **data storage** or transport **requirements**
- Reduces **time to market** and integration **costs**

Use case & partners

- Used in **edge devices** especially in manufacturing, smart energy, oil & gas, telecommunication and smart retail & building
- Ambitious growth goals for **expanding** their **acquisition capabilities** & channel **support**
- **Partners** include Intel, Dell, HPE & many more

Similar Companies

- **Macrometa** (2017, Series A (\$27.9 Mn), Partech Ventures, Sway Ventures, Pelion Ventures)
- **Kneron** (2015, Series A (\$90 Mn), Sequoia Capital, Alibaba, Foxconn Technology)

IOTech Systems

Search Field	Open Source Edge Platform
Location	Newcastle Upon Tyne, UK
Year Founded	2010
Funding in \$ Mn.	\$5.52 Mn
Last Round & Stage	Undisclosed Later Stage VC (04.2022)
Investor	Dell Technologies, SPDG Ventures, UK Government, EU, Northstar Ventures
Website	iotechsys.com

ObjectBox

Search Field Object-oriented Edge Database

Location Berlin, Germany

Year Founded 2015

Funding in \$ Mn. \$3.39 Mn

Last Round & Stage \$2 Mn Seed (12.2018)

Investor Techstars, Vito Ventures, Cavalry Ventures

Website objectbox.io

Business Overview

- Empowers fast, efficient & sustainable Edge Computing with a **high performance Edge Database** and Data Sync solution
- Enabling developers to work with data on **distributed edge devices** efficiently, quickly, and reliably with easy to use APIs
- Offers **10X data speeds** & bi-directional data sync that **reduces data transmission by 40%**

Use case & customers

- Used in **V2X solutions** as ObjectBox allows syncing of data between different devices in close to **real-time**
- **Customers** include Edeka, BMW Group, Skyworth and Scottish Power

Similar Companies

- **Couchbase** (2009, Public (07/2021))
- **Realm** (2011, Acquired (\$39 Mn), MongoDB)

Business Overview

- Platform to **manage and control edge devices** in complex industrial environments
- Enables users to **determine** whether connected devices are **trustworthy, reliable and secure**
- Provides details of **device performance**, allows establishing of **security rules**, and viewing **detailed reports**

Use case & partners

- Used in **Smart Factories** for monitoring assembly area devices at the edge
- **Partnered** with **Hitachi High-Tech** to work on their Smart Factory solution
- Member of **the US Space Force Catalyst Accelerator**

Similar Companies

- **Armis Security** (2015, Acquired (\$1.1 Bn), Insight Partners, CapitalG)
- **Ordr** (2015, Series B (\$50 Mn), Battery Ventures, Wing Venture Capital)

Corlina

Search Field Edge Security, Device Security

Location Menlo Park, US

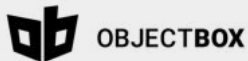
Year Founded 2017

Funding in \$ Mn. Undisclosed

Last Round & Stage Undisclosed

Investor N.A.

Website corlina.com



Edge Computing Software



Edge Computing Software

Crosser

Search Field	IoT Platform
Location	Stockholm, SWE
Year Founded	2016
Funding in \$ Mn.	\$8.65 Mn
Last Round & Stage	Undisclosed Later Stage VC (01.2023)
Investor	NTT DOCOMO Ventures, Industrifonden, 42 Capital, Spintop Ventures
Website	crosser.io

Business Overview

- Provider of AI-based **low code edge analytics, integration & automation platform** for industrial & enterprise IoT
- Platform is an on-site **middle-layer between sensor & cloud** or on-premise storage
- Enables the **processing of data** close to the point of origin **in real-time**

Use case & partners

- **Collects data** from sensors, **analyzes it, aggregates, filters, takes actions** in real-time, & **stores it at any** storage solution (e.g. cloud)
- Partners & customers include **Microsoft, AWS, Intel, Siemens & others**

Similar Companies

- **FogHorn** (2014, Series C (\$72.5 Mn), Intel Capital, GE Ventures, Dell, Plug and Play)
- **Nebbiolo Technologies** (2015, Series A (\$16.8 Mn), Gatewest Capital, Global IoT Tech Ventures)

Business Overview

- Developer of an **AI co-processor** and **entire software suite** for edge applications
- Offers a **low-power processor for edge devices** to run **high-resolution video and signal processing** data streams in real-time
- Utilizes **deep-learning algorithms** to meet low-latency and real-time requirements

Use case & partners

- The solutions are **geared towards defense, telecommunications, aerospace, smart cities, industry 4.0, autonomous vehicles & robotics**
- Partnering with **FPGA** acceleration manufacturer **BittWare**

Similar Companies

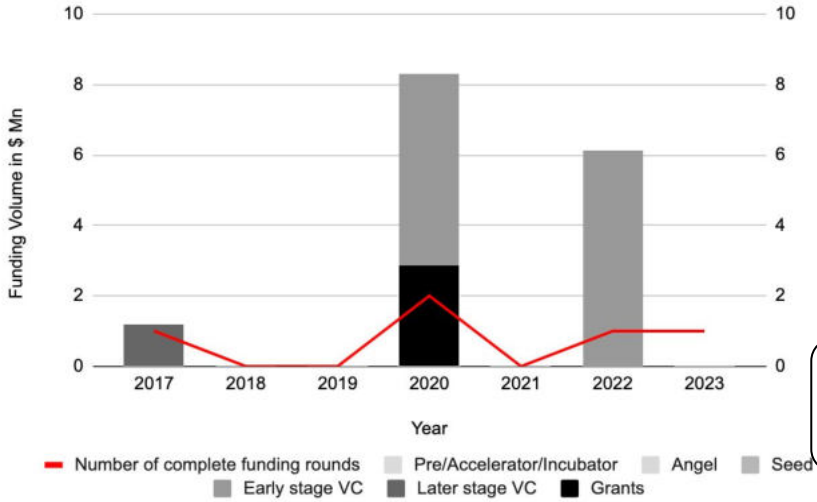
- **Rebellions** (2023, Grant (\$7.66 Mn), Angelnet, IMM Investment, Kakao Ventures)
- **Hailo** (2021, undisclosed), ABB Technology Ventures, Asi Shmeltzer, Astarc Ventures)

EdgeCortex

Search Field	Hardware Computing Platform
Location	Tokyo, Japan
Year Founded	2019
Funding in \$ Mn.	\$15.00 Mn
Last Round & Stage	\$10.00 Mn Series A (12.2021)
Investor	Cycle Group, Future Play, Monozukuri Ventures, Vajra Ventures
Website	edgecortex.com

Edge Hyperconverged Infrastructure

Less than half the startups in the segment received funding so far and 3 have already gone out of business



of complete funding rounds

of Companies total / funded
23 / 10

of Acquisitions
5

of IPOs
2

3 out of 10 VC-backed companies are already out of business. Out of the two IPOs, Mellanox Technologies IPOed in 2007 and subsequently received several PIPE investments until finally being acquired. Generally the venture segment does not seem attractive for startups.

Investment Volume last 24 months
\$6.12 Mn

Notable Corporates:

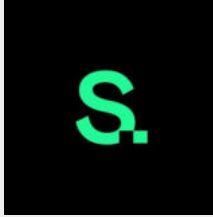
Notable Exits:

Acquired (\$7.82 Mn)
by Quantum
07/2021

Notable Investors:

Sunlight.io

Search Field	Hyperconverged Infrastructure Platform
Location	Cambridge, UK
Year Founded	2018
Funding in \$ Mn.	> \$11.57 Mn
Last Round & Stage	undisclosed Series A (01.2023)
Investor	OpenOcean, Robert Bosch Venture Capital
Website	sunlight.io



Edge HCI

Business Overview

- Offers **hyperconverged infrastructure** with a centralized **management platform** for running **applications** across the cloud, on-premise and **at the edge**
- Offers increased efficiency, not only **reducing** hardware **costs**, but also **power, space**, and **cooling requirements**, especially valuable for data-intensive workloads

Use case & partners

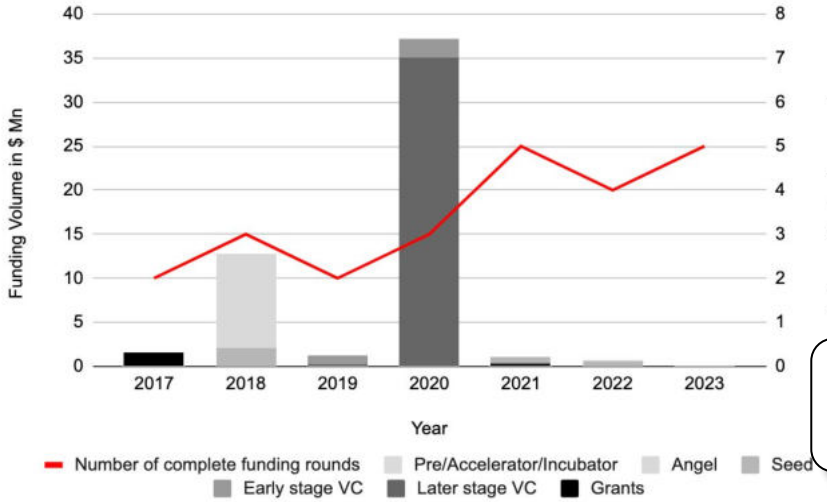
- Is **81%** more **CPU efficient** and **98%** more **RAM efficient** than two industry leading data center HCI solutions
- Enables use cases across a **variety of industries**
- **Partnered** with Intel, NVIDIA, AWS and Microsoft offering their edge HCI solution

Similar Companies

- **Medigate** (2017, Series B (\$50.3 Mn), Blumberg Capital, Partech Partners)
- **Forescout** (2000, Acquired (\$1.9 Bn), Advent International, Crosspoint Capital Partners)

Mobile Edge Computing

A majority of startups are currently still in their very early stages with 75% only reaching a seed funding round



of Companies total / funded
9 / 9

of Acquisitions
1

of IPOs
0

Investment Volume last 24 months
\$1.71 Mn

Startups in the segment are competing with AWS which has a private 5G product in place, and Microsoft, Cisco and Nokia are ready to compete in this market as well.

Notable Corporates:

Notable Exits:

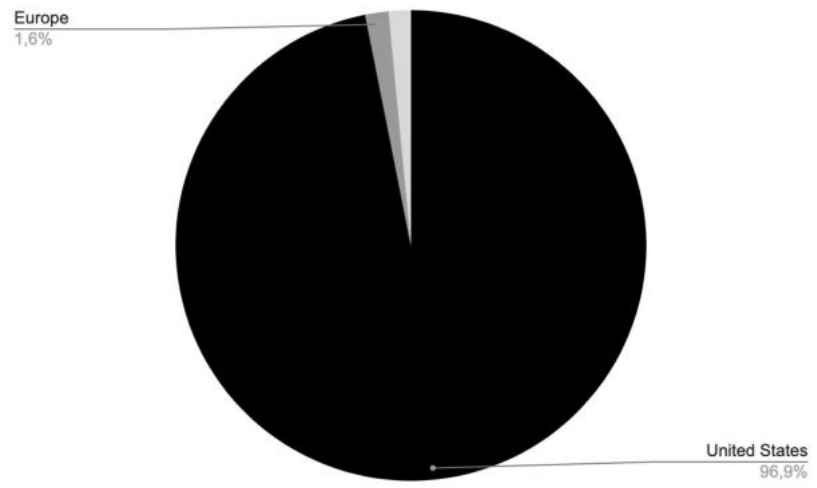
founded by **Deutsche Telekom** and acquired (undisclosed) by **Alphabet** (04/2022)

Notable Investors:

Startups Alef and Edison Interactive received 99% of the funding in the segment

Capital Invested by Global Region

by region in %



Take-away

- Edge software specialist **Alef is claiming a spot** in the emerging market for **pay-as-you-go private 5G**. The company is **delivering its edge API platform** to enterprises **via a hardware kit** it says will **enable corporate IT departments** to **install** their own **private networks within an hour**.

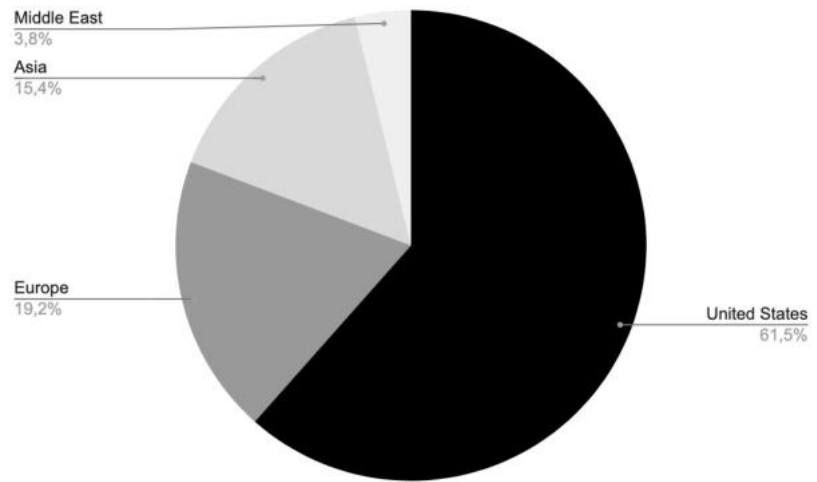
Top 10 Venture Rounds

by Funding Amount

Startup Name	Funding in Mn	HQ Location
Alef	\$35.00	USA
Edison Interactive	\$10.70	USA
Alef	\$5.00	USA
Edison Interactive	\$2.04	USA
Edison Interactive	\$2.00	USA
Edison Interactive	\$1.00	USA
Vimmi Communications	\$0.90	Israel
Spectronn	\$0.65	USA
EdgeNectar	\$0.64	USA
Neutron	\$0.62	Spain

Governments invest in MEC to develop edge infrastructure and support AV and smart cities technologies

Deal Count by Global Region
by region in %



Top 10 Investors
by Deal Count

Investor Name	Deal Count	HQ Location
Shunwei Capital	3	China
5G Ventures	2	Spain
Vinyl Capital	2	USA
EvoNexus	1	USA
EIT Digital	1	Belgium
National Science Foundation	1	USA
SAP.iO	1	Germany
The Catalyst Accelerator	1	USA
US Department of Defense	1	USA
Singtel Innov8	1	Singapore

Take-away

- **Governmental investors and the defense sector** have an **interest in mobile edge computing** to bring **computational capabilities closer to the edge** of the network, **decrease reliance on foreign infrastructure** and therefore **increase their national security**.
- **Several startups** in the MEC sector have **gone through an accelerator program** and are still in early stages of development.



Mobile Edge Computing

Alef (formerly AlefEdge)

Search Field	5G Edge Network Provider
Location	New York, US
Year Founded	2013
Funding in \$ Mn.	\$40.39 Mn
Last Round & Stage	\$35 Mn Series B (04.2020)
Investor	Tata Capital, Redwood Venture Partners, Select Venture Partners
Website	alefedge.com

Business Overview

- Alef EdgeNet is a collection of **interconnected Mobile Private Networks** driven by a **Software-Defined Mobile Edge (SD-ME)** platform that orchestrates applications, devices & network services seamlessly
- Enables enterprises and application developers to unleash the full power of the **Mobile Edge** using a **software defined** architecture

Use case & partners

- Used in **AI & Virtual Reality** applications, Smart Cities & **IoT devices** and building up **private networks**
- Partnering with **Dell Technologies** to offer a complete edge infrastructure

Similar Companies

- **Pensando Sytems** (2017, US, Series C (\$278 Mn), Qualcomm Ventures, Lightspeed Ventures, Hewlett Packard Enterprises)
- **Cloudbrink** (2019, US, Unfunded)

Business Overview

- Spectronn's SiFi **multi-access edge computing router** resiliently **connects devices to network** and computing **services**.
- **In case of connectivity loss**, the technology is intended to **provide access to mission critical applications** and data on the mobile edge **without internet connectivity**

Use case & partners

- Spectronn developed a "**mobile edge computing-in-a-box**" system tailored to the needs of **first responders**
- Spectronn's system always **offers a backup line of communication & computing** if local networks fail either partially or completely

Similar Companies

- **Abside Network** (2012, US, \$2.00 Mn (Seed), undisclosed)
- **NewEdge Signal Solutions** (2011, US, \$6.63 Mn (Acquired), Microelectronics Technology)

Spectronn

Search Field	SD-Wireless Networking
Location	Holmdel, US
Year Founded	2016
Funding in \$ Mn.	\$0.85 Mn
Last Round & Stage	\$0.02 Mn Accelerator (03.2022)
Investor	The Catalyst Accelerator, National Science Foundation, US DoD, US DHS, NIST
Website	spectronn.com

Mobile Edge Computing

SPECTRONN

We could **only identify two startups** in our search, therefore the funding graph and distributions have been removed.

Edge Application Management

Pelion

Search Field	Cellular Connectivity
Location	Scotland, UK
Year Founded	2000
Funding in \$ Mn.	undisclosed
Last Round & Stage	undisclosed (10.2022)
Investor	Scottish Equity Partners, Souter Investments
Website	pelion.com

Business Overview

- Aims to create the easiest path to secure and **scalable global cellular connectivity**
- Provides a **single supplier** with **one SIM and platform**
- Pelion's platform offers connectivity for **any device, anywhere, and on any cellular standard**

Use case & partners

- Global cellular connectivity provider with **customizable options for devices, networks, and data plans**
- **Notable clients** include Avanti West Coast, FaceWatch, SAVORTEX, Sensize

Similar Companies

- **Eseye** (2021, undisclosed (\$6.01 Mn), QQ Capital, TELUS Ventures, Accion)
- **floLIVE** (2023, (undisclosed), 83North, Arie Capital, Dell Technologies Capital)

Business Overview

- Enabling organizations to **operate distributed applications** at the distributed edge cloud
- Avassa Control Tower provides **central management** of **distributed edge** resources & applications through **user interfaces & APIs**
- Avassa Edge Enforcer provides functions, local **cluster management, application placement & scheduling**, & local **container registry** server

Use case & partners

- Used in **deploying & managing** massively distributed **edge clouds**, as extensions for the public cloud
- Part of the **TECoSA** edge computing research **partner network**

Similar Companies

- **LeanIX** (2012, Series D (\$120 Mn), Deutsche Telekom, Goldman Sachs, Insight Ventures)
- **Heroku** (2007, Acquired (Undisclosed), Parseq)

Avassa

Search Field	Container Application Management
Location	Stockholm, SE
Year Founded	2020
Funding in \$ Mn.	\$7 Mn
Last Round & Stage	\$7 Mn Series A (11.2020)
Investor	Industrifonden, Fairpoint Capital
Website	avassa.io



Edge Application Management



Edge Application Management

Over 150 startups can be found addressing Load Balancing. **Not all of them are active in the edge computing** sector. Therefore we have omitted the graphs.

Edge Load Balancing

Tetrate

Search Field	Application Load Balancing
Location	Milpitas, USA
Year Founded	2018
Funding in \$ Mn.	\$52.45 Mn
Last Round & Stage	\$40.00 Mn Series B (03.2021)
Investor	8VC, Dell Technologies Capital, Intel Capital, KAAJ Ventures
Website	www.tetrate.io

Business Overview

- Operates at the **edge of applications**, at the cluster ingress, and **between workloads** in both Kubernetes and traditional compute clusters
- Edge and ingress gateways **direct and balance application traffic across clusters, the edge and clouds**, while the **mesh manages connectivity** between services

Use case & partners

- Service mesh architecture** plays a crucial role in **modernizing application development** strategies for enterprises
- Notable clients** include Autodesk, Delta Dental, Gap, JUSPAY, KPMG, MicroStrategy, Sony, Square, the U.S. Air Force, VISA, and Wex

Similar Companies

- CloudBolt Software** (2020, Series B (\$35.00 Mn), Insight Partners, Hercules Capital BDC)
- Egenera** (2017, Secondary Transaction) Austin Ventures, Crosslink Capital, Pharos Capital Group)

Business Overview

- jetNexus ADC** ensures that core business **applications are always available** & delivered securely to end users with **speed & efficiency**
- Incorporates industry leading, hardened **firewall technology** to provide protection for web-based applications
- Pre-authentication** to prevent **untrusted traffic** from accessing internal resources

Use case & partners

- Used in **protecting applications & balancing workloads** between the edge & clouds
- Partnered with **AWS, Azure, Oracle, VMWare & Nutanix** to offer load balancing & application delivery controlling on hyperconverged infrastructure

Similar Companies

- Kemp Technologies** (2000, Acquired (\$258 Mn), Progress)
- Avi Networks** (2012, Acquired (Undisclosed), VMWare)



Load Balancing

edgeNexus

Search Field	Application Delivery Controller
Location	Marlow, UK
Year Founded	2017
Funding in \$ Mn.	undisclosed
Last Round & Stage	undisclosed
Investor	-
Website	edgenexus.io

Load Balancing

EDGE NEXUS

SUMMARY

1.

Big technology companies like Amazon, Alibaba, Google & Microsoft are building up end-2-end infrastructure solutions, while startups build upon this infrastructure and expand it. Here strategic partnerships are essential to startup efforts in the market.

2.

Edge Computing defines a fairly new market with many solutions tackling the problems of latency times, processing power & quality of processed data. The exponential rise in data generated by IoT devices will lead to high demand for cutting edge technologies in the future.

3.

PEAKZONE sees strongest opportunities for startups positioned within strategic partnerships, building Edge Processing Platforms & Edge Clouds that enable high data security, real-time applications, flexibility & scalability.

SUMMARY

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