Market Guide for Cloud Networking Software

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Initiatives: Cloud and Edge Infrastructure

A market is emerging to address “inside the cloud” and multicloud networking challenges, as there are notable gaps from existing vendors. I&O leaders should look to cloud networking software products to address functionality gaps and improve operations within cloud and multicloud environments.

Overview

Key Findings

- Client interest in cloud networking has increased dramatically (over five times) in the past 12 months.
- The native networking capabilities of public cloud providers are insufficient for some production enterprise workloads.
- Virtual routers and virtual appliances offered by established vendors often don’t meet the requirements of cloud and DevOps teams, particularly around programmability, integration or licensing.
- Networking features and operational approaches vary widely across public cloud providers, which creates management challenges, particularly in multicloud deployments.

Recommendations

I&O leaders responsible for cloud and networking should:

- Enable flexibility to address changing needs by making short-term investments with a one- to three-year time horizon. We expect the market to be dynamic with new entrants and a high level of change and innovation. This is a departure from typical network planning cycles, which are often three to five years.
- Optimize cloud networking software investments by preferring lightweight, “cloud-aware” products that are offered via consumption-based pricing, with robust and well-documented APIs.
- Exploit the benefits of public cloud providers by preferring their native capabilities when starting out or when there is a single cloud provider strategy. Don’t forklift traditional networking strategies into the public cloud.
Support advanced networking features and/or network consistency for multicloud deployments by using third-party cloud networking software.

**Strategic Planning Assumptions**

By 2023, 40% of all enterprise workloads will be deployed in cloud infrastructure and platform services, up from 20% in 2020.

Through 2023, less than 2% of customers will extend existing data center networking products into public cloud environments.

By 2025, 35% of companies that use multiple public cloud providers will use a single network stack, an increase of over 10 times from May 2021.

**Market Definition**

Cloud networking software enables the design, deployment and operation of a network within multiple cloud environments. Organizations using cloud networking software can deploy it in one, or multiple, cloud environments, including public cloud(s), “private cloud(s)” (see Note 3) and distributed cloud/edge locations. These products enable consistent networking policy, network security, governance and network visibility across multiple cloud environments via a single point of management. These products address traffic routing, secure ingress/egress, and integrate with available services. These products are delivered as software, which can be self-managed and/or delivered as a service, and are accessible via APIs and UIs. They can utilize overlays and agents and/or orchestrate native cloud provider capabilities. Refer to the Market Analysis section for specific product details.

**Market Description**

Cloud networking software supports applications and workloads in cloud environments, including servers, containers, storage and other services such as databases, load balancers and firewalls. This networking software augments and/or replaces network functionality that exists within private data centers and colocation facilities, or within public cloud providers’ environments. Further, cloud networking software enables consistent networking features and management within multiple cloud environments that may otherwise have disparate capabilities.

**Vendor Terminology**

Vendors use several terms (in addition to “cloud networking”) to market their related products, including: “multicloud networking” (see Note 4), NaaS, overlays and network virtualization.

**Typical Buyers**

The most common buying center (i.e., budget owner) in this market is a network team (network engineering, network architecture), who typically reports up to the VP of infrastructure, under the CIO. However, this market is heavily driven and influenced by non-networking teams. Over the past six months, Gartner analysts have received more calls from enterprise architecture/technology innovation...
teams on the topic of cloud networking than from IT infrastructure and operations. Refer to Note 6 for examples.

Use Cases

There are several discrete use cases for cloud networking software, summarized below in Table 1. Refer to the Market Analysis section for detailed breakdown of each use case.

Table 1: Top Use Cases for Cloud Networking Software

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Estimated Installed Base Using Cloud Networking Software</th>
<th>Client Interest</th>
<th>Key Buyers and Influencers</th>
<th>Sample Vendor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloudify the Data Center</td>
<td>5,000 to 10,000</td>
<td>Steady</td>
<td>Network, virtualization, security teams</td>
<td>VMware</td>
</tr>
<tr>
<td>Public Cloud Enhancement</td>
<td>Several hundred to 1,000</td>
<td>Growing</td>
<td>Network, cloud teams</td>
<td>Aviatrix, Cisco</td>
</tr>
<tr>
<td>Multicloud</td>
<td>Several hundred to 1,000</td>
<td>Growing</td>
<td>Cloud, network teams</td>
<td>Aviatrix, Alkira</td>
</tr>
<tr>
<td>Edge</td>
<td>Fewer than 100</td>
<td>Embryonic</td>
<td>Varied</td>
<td>Varied</td>
</tr>
<tr>
<td>Kubernetes</td>
<td>Fewer than 500</td>
<td>Growing</td>
<td>Platform, security, network</td>
<td>Open source (e.g., Calico, Cilium)</td>
</tr>
<tr>
<td>Hybrid Cloud</td>
<td>Fewer than 100</td>
<td>Declining</td>
<td>Network, cloud teams</td>
<td>Cisco, VMware</td>
</tr>
</tbody>
</table>

Source: Gartner (May 2021)

Market Direction

Adoption of cloud services has had a dramatic impact on enterprise network architectures. With SaaS and IaaS, organizations were forced to rethink long-standing connectivity paradigms. This represented a “to the cloud” challenge and led to innovations including SD-WAN and software-defined cloud interconnection (SDCI). Organizations are increasingly becoming more mature with their “to the cloud” strategy.
Now, we're observing a shift in focus to **in the cloud** networking. In the next three years, Gartner believes this market will be heavily driven by public cloud adoption. Most organizations are making substantial commitments to public cloud infrastructure to increase the pace of innovation and drive new business.\(^1\),\(^2\),\(^3\) It is relatively simple to implement basic network functionality in cloud provider networks, but it is difficult to add feature depth and scalability that many network teams are accustomed to. This creates increasing demand for cloud networking software.

Thus, we've seen increasing interest in cloud networking, and we expect this to continue:

- Client inquiry on the topic of cloud networking has increased dramatically over the past two years — more than five times from the first quarter of 2019 to the first quarter of 2021 (see Figure 1).
- Similarly, social media conversations around cloud networking saw a 24% increase from April 2018 through March 2021.\(^4\)

**Figure 1: Client Inquiry on Cloud Networking**

**Client Inquiry on Cloud Networking – Increasing**

![Trendline](image-url)
Additional market drivers that will increase cloud networking software demand are adoption of cloud-native technologies (see Note 7) and distributed composite applications (see Note 8).

Market Analysis

Elements of Cloud Networking Software

Cloud networking software can be a stand-alone product offering or a feature in a broader product suite such as data center networking, a cloud platform product or SD-WAN. Cloud networking software typically includes most of the following core virtual networking and management/operations capabilities identified below. This functionality can be provided via orchestration of the underlying cloud environment, or it can be included directly within the cloud networking vendor's software. Many vendors offer a hybrid approach.

Core Virtual Networking

- IPv4/IPv6 routing (i.e., BGP, Static, OSPF)
- VLANs/Subnets and first-hop redundancy protocols
- ACLs
- Segmentation via VRF/VPC
- Microsegmentation
- Service insertion and traffic steering for L4-7 services
- NAT and/or PAT
- VPN/Encryption (AES-256)

Management/Operations

- Single point of configuration, management and visibility, across multiple cloud environments
- Open published API that exposes 90% of functionality or greater
- UI (which can be CLI)
- Integrations with Terraform, Ansible and other common cloud automation tools
- Centralized reporting and logging
- Centralized governance and compliance
- Advanced troubleshooting/analytics including flow logging and path tracing
- Role-based access control
Public Cloud Integrations
For cloud networking software used in a cloud infrastructure and platform services (CIPS) environment, the product typically provides integration and/or orchestration for multiple services, and in a dynamic manner (via the cloud provider's API). Specific integrations that are available include:

- VPN gateway and encryption for egress traffic (AES-256)
- Transit hubs
- Firewall
- L4 network load balancers
- Security groups and ACLs
- L7 load balancers/application gateways
- Global load balancing
- Traffic mirroring, including packet brokering
- DNS services
- CDN
- Traffic flow logs

Refer to Solution Criteria for Cloud Integrated IaaS and PaaS for more details regarding networking features available from CIPS providers.

Outside the Scope of Cloud Networking Software
Hardware is not included in this market because cloud networking software products are agnostic to the underlying physical network hardware. Also, physical transport of traffic to and between clouds is an adjacent function, not a required portion of this market. The native network capabilities of a public cloud provider are not part of this market if they cannot be applied in any cloud environment other than their own. Finally, products that provide only read-only visibility/monitoring of cloud networks are not considered part of this market.

Wait a Second, Isn’t This Market Just vRouters?
Most established network and L4-7 appliance vendors offer virtual versions of their products that can be installed in multiple cloud environments, including on-premises and also within public cloud
environments. So, that begs the question for cloud networking software, “Isn’t this just vRouters or vAppliances?”

The answer is nuanced. These virtual routers are often used by clients for basic VPN connectivity from on-premises to a public cloud environment. However, clients tell us that, when they try to extend these vRouters beyond basic VPN use cases to support broader networking requirements, they rarely meet their needs.

Clients relate that they are not “cloudlike,” which is due to several factors including:

- **Lack of cloud awareness/integration** — The products aren't aware of native cloud functionality, such as services, regions or availability zones. They reside in a public cloud environment but do not dynamically interact with surrounding services.

- **Limited programmability** — While there may be an API, the usability, support, documentation or functionality falls short of what cloud teams need from an automation/orchestration perspective.

- **Licensing** — The products’ costs, licensing models and/or commercial terms don’t align with cloud teams’ desire for low-friction access, variable and unpredictable consumption, or self-service.

- **Limited experience** — The vendors’ sales teams, channels, technical support teams and/or technical documentation lack reference customers and/or experience regarding usage in a true cloud environment.

- **There are performance limitations** such as bandwidth or throughput.

**Key Buying Criteria**

Diverse criteria shape buying decisions in this market, including:

- **Network functionality** — This entails the specific network feature/functionality that is needed, such as a routing protocol, load-balancing algorithm or VPN support. In some instances, the network functionality is not present in the native cloud environment or lacks the appropriate feature depth or scalability.

- **Cloud “awareness” and integration** — This entails how deeply a product is integrated into a cloud environment. For example, whether the product is simply installed in a cloud environment is different from if it is deeply integrated in it and actively aware of adjacent cloud services such as load balancers, autoscaling, security groups and availability zones. In on-premises use cases, integrations with common virtualization/cloud suites are important.

- **Security** — Buyers are interested in the depth and breadth of the vendor’s security stack, including segmentation, encryption and firewalls. This capability may be native to the cloud networking software vendor or integrated with a third party.
Programmability and automation — Cloud and DevOps teams require solutions that are highly automated and programmable with an open, published and RestFUL API that exposes nearly all features, is well-documented and is backward compatible with prior versions.

Low friction — Friction of acquisition is key for cloud and DevOps teams. An example of lower friction includes availability in public cloud marketplaces (without the requirement to bring your own license), open-source and freemium options where large upfront commercial engagement with vendor sales isn't required.

Breadth of cloud environments — Organizations looking to extend the same networking software across multiple environments are drawn to products that have deep integration with popular cloud environments such as Amazon Web Services (AWS), Microsoft Azure, Alibaba, Google, VMware and others.

Incumbency is a driver for network teams who have substantial expertise with existing vendors.

Tooling integration — Buyers are often interested in whether the vendor has integration with common cloud management and automation tooling such as Terraform and Ansible.

Open-source culture — Similar to how network teams often prefer existing vendors, some DevOps and platform teams have a strong cultural inclination toward open-source solutions.

Costs and licensing models — The total cost and style of licensing models are important. For example, some teams prefer consumption that ties to usage (perhaps from a cloud provider marketplace), while others prefer consistent term-based licensing and/or a perpetual model.

Operational model — Enterprises can implement the cloud networking solution in a do-it-yourself (DIY) mechanism, as a managed service, and SaaS.

Public Cloud Networking

In CIPS environments, many organizations start with the native cloud provider’s networking tools. However, as organizations expand in size, scope and complexity, or extend to multiple clouds, their likelihood to look beyond the native stack increases (see Figure 2).
Use Cases

We observe several distinct use cases for cloud networking software, including the six scenarios described below. Most suppliers focus on a finite set of use cases, such as public cloud/multicloud or Kubernetes, versus covering all use cases. In fact, few suppliers cover all use cases particularly well today.

Use Case No. 1 — “Cloudify” the Private Data Center

In this mature scenario, the enterprise is looking to create a cloud-inspired experience in its data center. Thus, customers want their data center network to be more automated and offer self-service (although consumption and metered billing is not usually available). The existing, installed data center network has ample physical switching capacity; thus, the enterprise doesn't need new physical switches. Enterprises desire strong automation and programmability to adjust network capabilities in software. Organizations often desire turnkey integration into broader cloud and data center, ticketing and virtualization systems such as vCenter, Kubernetes, Ansible, OpenShift and ServiceNow. Cloud networking software is not the only option to address this usage scenario.

Use Case No. 2 — Public Cloud Enhancement
In this emerging scenario, the enterprise has workloads deployed in a single public cloud provider such as AWS, Azure, Google or Alibaba. The native networking offerings within cloud providers can fall short in a few key areas such as feature depth, scalability, visibility and operations/management. Thus, enterprises look to add network features or improve/replace the level of management, automation, visibility and troubleshooting natively available from the cloud provider. For example, enterprises may want more BGP features or bandwidth aggregation beyond what the native cloud provider offers, or to support more VPN tunnels than the cloud provider allows. Enhancements include functionality such as advanced routing (i.e., protocol options and route limits), encryption, visibility, bandwidth support and troubleshooting. Architecturally, the cloud networking software can either orchestrate the underlying cloud provider's native capabilities or replace them. Integration with Terraform and the native provider's automation capability (e.g., AWS CloudFormation) is strongly desired.

Use Case No. 3 — Multicloud (i.e., Workloads in Multiple Public Cloud Providers)

More than three in four respondents from organizations that use IaaS indicate their organization works with multiple IaaS providers. In this emerging scenario, an enterprise has workloads in multiple public cloud providers such as AWS, Azure, Google or Alibaba. However, they desire consistent networking functionality and management (including APIs) for the different cloud provider environments. Thus, the enterprise installs cloud networking software into multiple public cloud environments. This provides consistency and also helps to scale cloud deployments beyond simple usage scenarios. In many cases, the enterprise also uses some of the advanced features available from the cloud networking vendor (so this often overlaps with use case No. 2). Architecturally, the solution can either orchestrate the underlying cloud provider's native capabilities or replace them. Integration with Terraform and the native provider's automation capability (i.e., AWS CloudFormation) is strongly desired.

Use Case No. 4 — Edge Networking

Adoption of cloud networking software for edge computing (see Note 5) is a bleeding-edge use case. Edge locations are linked to core computing resources (often multiple cloud-based services) to form a distributed environment, managed as a single construct. Cloud networking software can be used to build an integrated network “fabric” to provide consistent end-to-end network services and management across this environment, which can be a complex multivendor deployment (see Exploring the Edge: 12 Frontiers of Edge Computing). Architecturally, the solution can either orchestrate the underlying cloud/edge provider’s native capabilities or replace them. Gartner clients commonly mention vendors including Akamai, AWS, Cloudflare, Fastly, Microsoft, Swim and Veea in these types of scenarios. In some cases, the edge locations leverage distributed cloud capabilities (a distribution of public cloud services to different physical locations, while operation, governance, updates and evolution of the services are the responsibility of the originating public cloud provider).

Use Case No. 5 — Kubernetes Networking

In this emerging scenario, the location of the workload is not the major driver for investment into cloud networking software. Instead, decisions around networking are driven by the choice of computing abstraction and application architecture, particularly Kubernetes (K8s). Kubernetes can be deployed in
public or private data centers. In this scenario, enterprises typically desire more advanced networking capability than what native K8s provides and/or that is offered by the K8s platform provider.

K8s networking primarily entails three components: container networking interface (CNI), ingress controller and service mesh. The CNI handles communications inside the K8s pod, service mesh handles service-to-service communications, while connectivity to the outside world is via ingress controllers. Cloud networking software usually includes advancements in the areas of security, scale and troubleshooting visibility. Service mesh provides applications services such as load balancing and encryption.

Use Case No. 6 — Hybrid Cloud Networking

This refers to cloud implementations that span on-premises and public cloud deployments, whereby public and private cloud services operate as separate entities, but are integrated. This use case is massively underserved by cloud networking software vendors. Gartner estimates that 10% to 15% of enterprises have implemented hybrid clouds, but that fewer than 100 of these customers are using a single networking stack. While the workload migration to public cloud is unabated, customers will be running hybrid cloud architectures for a long time due to application dependencies, data gravity and privacy reasons. IT teams cite networking challenges in a hybrid architecture regarding security, common policy governance and unified visibility of all their resources. To date, enterprises have patched this together with DIY approaches, not using cloud networking software.

Market Financial Estimates

We estimate the overall market size for cloud networking software to be in the $2 billion range in annual vendor revenue, which excludes the public cloud providers’ native networking software. This revenue is split dramatically between private data centers and public cloud environments. Private data center deployments constitute most of the existing revenue, while public cloud constitutes much higher growth:

- For private data center cloud-inspired deployments, we estimate the 2020 market size was in the $1.5 billion to $2 billion range for vendor revenue, and we expect CAGR in the 1% to 5% range through 2025.
- For public cloud deployments, we estimate the 2020 market size was in the $100 million range in vendor revenue, and we expect CAGR to be in the 20% to 40% range through 2025.

Who Will Compete in This Market Long Term?

This market is dynamic, and several use cases are evolving rapidly, and we expect substantial changes in the vendors over the next 24 months. In addition to current players, we expect additional market entrants. Further, some of the use cases may diverge into features of broader platforms and/or into their own dedicated markets. There are a number of vendors from diverse backgrounds that we anticipate competing (see Note 9):

Representative Vendors
The vendors listed in this Market Guide do not imply an exhaustive list. This section is intended to provide more understanding of the market and its offerings.

Market Introduction

This section is intended to show vendors that address some or all of the usage scenarios described earlier (see Table 2).

### Table 2: Representative Vendors in Cloud Networking Software

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Product/Service or Platform Branding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkira</td>
<td>Network Cloud</td>
</tr>
<tr>
<td>Arista Networks</td>
<td>Any Cloud Platform</td>
</tr>
<tr>
<td>Arrcus</td>
<td>Multi-Cloud Networking (MCN)</td>
</tr>
<tr>
<td>Aviatrix</td>
<td>Cloud Network Platform</td>
</tr>
<tr>
<td>Cisco</td>
<td>Cloud Services Router 1000V (CSR1kv), ACI Anywhere</td>
</tr>
<tr>
<td>Isovalent</td>
<td>Cilium Enterprise</td>
</tr>
<tr>
<td>Prosimo</td>
<td>AXI Platform</td>
</tr>
<tr>
<td>Tigera</td>
<td>Calico Enterprise</td>
</tr>
<tr>
<td>VMware</td>
<td>NSX Cloud</td>
</tr>
</tbody>
</table>

Source: Gartner (May 2021)

Further, there are relevant open-source projects including Calico, Cilium, Consul, Istio, Open Virtual Network (OVN) and Tungsten Fabric.

**Market Recommendations**

For all use cases:
Use a short-term planning horizon by signing contracts of one to three years (or using consumption-based options), as we expect the market to be dynamic with new entrants and a high level of innovation.

Make investments based on specific use-case requirements. It is unlikely that a single vendor will effectively handle all use cases for the next 18 months.

Prefer vendors that offer fully documented, public, open APIs, with a track record of reverse compatibility.

Prefer solutions that offer either strong security features (e.g., segmentation, encryption, firewall) and/or provide turnkey integration with your selected security vendors.

Periodically review your strategic cloud providers’ new networking features to see how they are closing the gaps.

For on-premises use cases:

- Avoid trying to replicate hyperscaler offerings in private data centers, as it is not feasible for most enterprises.
- Separate cloud networking software decisions from networking hardware decisions to optimize networking investments for agility and cost.

For public cloud use cases:

- Don’t forklift or replicate traditional data center networking strategies into the public cloud, as it will lead to integration and cost inefficiencies.
- Prefer the native capabilities of the cloud providers when starting out, and when there is a single-provider strategy.
- Invest in third-party cloud networking software when advanced networking features or consistency across clouds is critical.
- When investing in cloud networking software, prefer offerings that are delivered as a service, propose API-first approaches, and are “cloud-aware.”
- Prefer vendors that offer consumption-based pricing, particularly if your needs are unpredictable or highly dynamic.

For K8s use cases:

- Pilot open source for K8s environments to determine usability and functionality.
Expect to make fit-for-purpose investments in the three key Kubernetes networking areas, CNI, ingress control and service mesh investments, versus a one-size-fits-all approach.

Evidence

Gartner’s Data Center Networking Priority Poll 2021 was conducted online from 11 January through 18 January 2021 with 427 Gartner ITL Research Circle members. Participants are enterprise-level CIOs/CTOs, IT leaders focused on enterprise architecture and/or infrastructure and operations from a range of regions, industries and revenue sizes. The results of this study are representative of the respondent base and not necessarily the market as a whole.

1 Gartner inquiry — Over the six-month time frame ending 28 April 2021, Gartner analysts had more than 150 inquiries on the topic of cloud networking.

2 Gartner’s 2020 Cloud End-User Buying Behavior Study was conducted to understand how technology leaders approach buying, renewing and using cloud technology. The research was conducted online from July through August 2020 among 850 respondents from midsize and larger ($100 million or more in revenue) organizations in the U.S., Canada, the U.K., Germany, Australia and India. Industries surveyed include energy, financial services, government, healthcare, insurance, manufacturing, retail and utilities. All organizations were required to currently have deployed cloud. Respondents are involved, either as a decision maker or decision advisor, in new purchases, contract renewals or contract reviews for one of the following cloud types in the past three years: public cloud infrastructure (IaaS), public cloud platform (PaaS), public cloud software (SaaS), private cloud infrastructure, hybrid cloud infrastructure or multicloud infrastructure. Respondents were also required to work in IT-focused roles, with a small subset of procurement respondents. The study was developed collaboratively by Gartner Analysts and the Primary Research team.

Results of this study do not represent global findings or the market as a whole but reflect sentiment of the respondents and companies surveyed.

3 Gartner’s 2020 Public Cloud Initiatives Study was conducted online from 16 September through 3 November 2020 with 400 infrastructure and operations leaders with public cloud migration strategies from the U.S. (n = 208) and the U.K. (n = 192) to explore public cloud migration strategies, challenges and benefits, including total cost of ownership. Respondents’ organizations had an annual revenue of at least $500 million or over 1,000 employees for public sector organizations — over half with annual revenue of over $5 billion. All respondents are at organizations currently engaged in public cloud migration activities and are at a level of involvement to accurately depict budgeting and strategies.

Results are representative of the respondent base of this survey and not necessarily projectable to the market as a whole.

4 Social Media Analysis: Gartner conducts social listening analysis leveraging third-party data tools to complement or supplement the other fact bases presented in this document. Social media data in
reference is from 1 April 2018 through 30 March 2021 in all geographies and recognized languages. However, it is important to note that the data for China is largely nonrepresentative due to the restrictions that China places on foreign-owned social media platforms.

5 Gartner’s Container Adoption and Strategy Survey (2020) was conducted online from 3 March through 18 March 2020 with 91 members of Gartner’s Research Circle — a Gartner-managed panel of IT leaders. To participate, a respondent’s organization had to be involved in container technologies: 60% of respondents are currently using container technologies, 28% are piloting/testing and 12% have plans to adopt. Respondents came from across the world with a majority from Europe (49%) and North America (33%).

Results are representative of the respondent base of this survey and not necessarily projectable to the market as a whole.

6 Gartner’s Public Cloud Networking Poll (2020) was conducted online from 28 September through 8 October 2020 with 202 members of Gartner’s ITL Research Circle — a Gartner-managed panel of IT leaders. Participants are IT leaders focused on enterprise architecture and/or infrastructure and operations from a range of regions, industries and revenue sizes. The results of this study are representative of the respondent base and not necessarily the market as a whole.

7 Gartner Enterprise Network Equipment Market Share and Gartner Enterprise Network Equipment Forecast.

Note 1
Representative Vendor Selection
The vendors named in this guide were selected as representative vendors. They offer products that directly align with specific use cases, and actively market and sell into enterprise opportunities.

Note 2: Gartner’s Initial Market Coverage
This Market Guide provides Gartner’s initial coverage of the market and focuses on the market definition, rationale for the market and market dynamics.

Note 3: Private Cloud
We’re referring to enterprises commonly using the term “private cloud,” which may fall short of Gartner’s official definition of private cloud, which is:

Private cloud computing is a form of cloud computing used by only one organization, or one that ensures an organization is completely isolated from others. As a form of cloud computing, it has full self-service, full automation behind self-service and usage metering. It does not have to be on-premises or owned or managed by the enterprise.
Note 4: Multicloud Networking

Multicloud networking is a distinct subset of “cloud networking software,” which enables the design, deployment and operation of a network within multiple public cloud environments. In comparison, the broader category of “cloud networking software” is not restricted only to public cloud environments.

Note 5: Edge Computing

Edge computing is a distributed computing topology in which information processing is located close to where things and people produce or consume that information and is a complement to cloud computing.

Note 6: Buyer Examples

Examples of these additional buyers include:

- Cloud team, specifically the cloud architecture team (often reporting to the CTO or part of EA), who drives heavy influence on the public cloud, hybrid and multicloud use cases.
- Security team (typically part of the CISO organization).
- Platform engineering teams. In particular, platform teams often drive heavy influence around application modernization and cloud-native application use cases, often when they involve new platform technologies such as containers and Kubernetes.
- Other influencers, who themselves may not have a budget, include DevOps teams, platform ops teams and site reliability engineers (SRE).

Note 7: Additional Market Drivers: Cloud-Native Adoption (Including K8s, Containers and Microservices)

The market adoption of containers has crossed the chasm of early adopters into more mainstream enterprise customers. According to a Gartner survey of organizations that are engaged with container technologies, 12% have plans but no significant activity yet, 28% are just getting started, while 42% have deployed at least a few containerized applications into production. It is worth noting that, while adoption of containers is growing across enterprises, the ratio of containerized applications is not high yet. Gartner estimates that less than 10% of enterprise applications are containerized today. This will drive growth in this market, particularly for the Kubernetes networking use case.

Note 8: Additional Market Driver: Distributed Composite Applications

There is an emerging class of applications that is highly modular, extensible and distributed. Gartner refers to this as the “composable enterprise” (see Future of Applications: Delivering the Composable Enterprise). Application components can be anywhere: in hundreds of edge locations, XaaS providers, colocation facilities and on-premises data centers, which results in complex traffic patterns. Currently, adoption of these distributed composite applications is nascent, but growing. To date, no one vendor offers an integrated end-to-end network across this multisite environment. However, we believe this will
increase buyer demand for a combined cloud/edge network fabric that delivers consistent end-to-end policies and management.

**Note 9: Potential Vendor Market Entrants**

- **Public cloud vendors** — Today, public CIPS vendors focus primarily on their networking functionality within their environments, but we expect they will increasingly support networking software that can be installed outside their specific environments. Distributed cloud offerings like Outposts from AWS are an example (see Magic Quadrant for Cloud Infrastructure and Platform Services).

- **SD-WAN vendors** — We expect a small number of SD-WAN vendors to expand into this market, given their experience with public cloud environments (integrations with Azure Virtual WAN and AWS Transit Gateway). We expect they will target existing customers with cloud-first workload policies (see Magic Quadrant for WAN Edge Infrastructure).

- **Established data center vendors** — These vendors often focus on looking to extend policy and management from on-premises environments into the public cloud. While there is a high degree of marketing of this, we observe very limited customer adoption. We expect strong continued investments from these vendors in this space, including new entrants, with a focus on lightweight versions and looser coupling with their on-premises stacks compared to today (see Market Guide for Servers, Market Guide for Server Virtualization and Market Guide for Data Center Switching).

- **Cloud connectivity providers** — Providers that specialize in to-the-cloud connectivity, particularly SDCI vendors, are likely to offer software that meets the requirements.

- **Startup vendors** — We see strong interest in clients in “born in the cloud era” vendors such as Aviatrix, Alkira and, more recently, Prosimo, who target public cloud use cases where native capabilities fall short. There are also K8s-oriented vendors including Isovalent and Tigera.

- **Open source** — We see strong interest in open-source projects Cilium, Calico, Istio and Consul, and their associated commercial ecosystems, particularly for K8s use cases.

- **K8s platform providers** such as SUSE-Rancher Labs, Red Hat and VMware offer CNI and service mesh capabilities along with their Kubernetes distributions.

**Recommended by the Authors**

- Cool Vendors in Cloud Networking
- Best Networking Practices Inside the Public Cloud
- Cool Vendors in Enhanced Internet Services and Cloud Connectivity
- Technology Insight for Multicloud Networking
- Market Guide for Data Center Switching
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<th>Key Buyers and Influencers</th>
<th>Sample Vendor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloudify the Data Center</td>
<td>5,000 to 10,000</td>
<td>Steady</td>
<td>Network, virtualization, security teams</td>
<td>VMware</td>
</tr>
<tr>
<td>Public Cloud Enhancement</td>
<td>Several hundred to 1,000</td>
<td>Growing</td>
<td>Network, cloud teams</td>
<td>Aviatrix, Cisco</td>
</tr>
<tr>
<td>Multicloud</td>
<td>Several hundred to 1,000</td>
<td>Growing</td>
<td>Cloud, network teams</td>
<td>Aviatrix, Alkira</td>
</tr>
<tr>
<td>Edge</td>
<td>Fewer than 100</td>
<td>Embryonic</td>
<td>Varied</td>
<td>Varied</td>
</tr>
<tr>
<td>Kubernetes</td>
<td>Fewer than 500</td>
<td>Growing</td>
<td>Platform, security, network</td>
<td>Open source (e.g., Calico, Cilium)</td>
</tr>
<tr>
<td>Hybrid Cloud</td>
<td>Fewer than 100</td>
<td>Declining</td>
<td>Network, cloud teams</td>
<td>Cisco, VMware</td>
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</tbody>
</table>

Source: Gartner (May 2021)
<table>
<thead>
<tr>
<th>Vendor</th>
<th>Product/Service or Platform Branding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkira</td>
<td>Network Cloud</td>
</tr>
<tr>
<td>Arista Networks</td>
<td>Any Cloud Platform</td>
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<tr>
<td>Arrcus</td>
<td>Multi-Cloud Networking (MCN)</td>
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<tr>
<td>Aviatrix</td>
<td>Cloud Network Platform</td>
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<tr>
<td>Cisco</td>
<td>Cloud Services Router 1000V (CSR1kv), ACI Anywhere</td>
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<tr>
<td>Isovalent</td>
<td>Cilium Enterprise</td>
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<tr>
<td>Prosimo</td>
<td>AXI Platform</td>
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<tr>
<td>Tigera</td>
<td>Calico Enterprise</td>
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<td>VMware</td>
<td>NSX Cloud</td>
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</table>

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