



5G Mobile Core Disruptors: Competitive Landscape Assessment

February 24, 2022

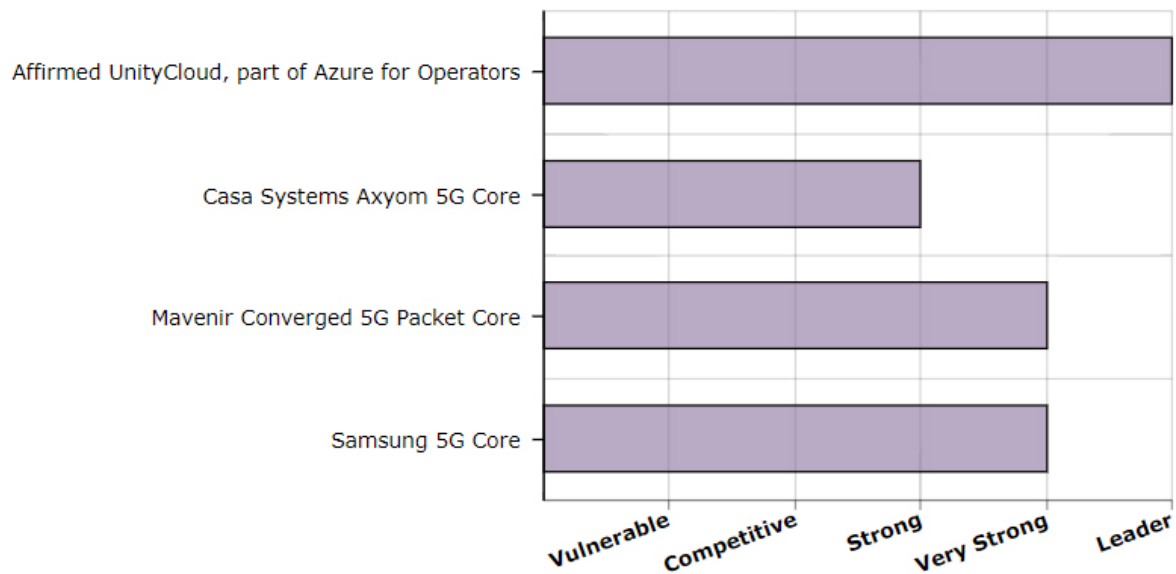
Glen Hunt
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COMPETITIVE LANDSCAPE ASSESSMENT - 5G MOBILE CORE DISRUPTOR

REPORT SUMMARY:

5G mobile core disruptors are impacting mobile networking by bringing new levels of openness, cloud-native technology, efficiency, automation, cloud access, and service agility to 5G, without the complexity burden of legacy cores.

PRODUCT CLASS SCORECARD



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MARKET OVERVIEW

| | |
|--------------------------|---|
| Product Class | 5G Mobile Core Market Disruptors |
| Market Definition | <p>This assessment covers emerging 5G mobile core (5GC) products from vendors that comply with 3GPP standards, are based on cloud-native technologies, exploit open source-based solutions (components and tools), and focus on accelerating 5G use cases like eMBB, IoT, fixed wireless access (FWA), business to business (B2B), business to business to consumer (B2B2C) applications, factory automation, and numerous vertical market applications. As use cases expand beyond eMBB, the seamless use of cloud resources and effective automation will be key to success.</p> <p>The 5GC provides the management and control software (mobile core) initially specified by 3GPP Rel-15 for commercial 5G services which supported early 5G base station technology and enhanced eMBB. 3GPP Rel-16 enhanced the foundation to improve system performance and efficiency, included IMT-2020 recommendations. Rel-17 supports reduced-capability user equipment, a widened range of use cases, non-terrestrial networks (NTN), and additional Radio variants beyond 52.6GHz. The market requires multiple new service capabilities including network slicing, low latency, higher performance, and distributed user plane (MEC) and the use of automation and telemetry tools (CNCF).</p> <p>Mobile operators are modernizing their infrastructures to capture revenue from higher speed eMBB, leverage fixed wireless access (FWA) to compete with fixed broadband and provide a better experience for their wireless customers. Both wireless carriers and cable companies could use CBRS spectrum (US) to deliver FWA services, enterprises will be able to use the spectrum for 4G or 5G private wireless networks, and to replace Wi-Fi for in-building use cases.</p> <p>Capturing high-value enterprise services (B2B) is also a priority; for many operators to offset static or declining connectivity revenues with higher ARPU services. The ability to deploy workloads in on the public cloud provides operators with greater flexibility and potential cost savings.</p> <p>The private 5G cellular network market is expanding, driven by many factors including dedicated spectrum and legacy infrastructures reaching end-of-life; this opens the door to innovative 5G solutions that can adapt to challenging requirements (edge-based deployments, environmental hardening) and the need for remote management and monitoring (automation and AI).</p> <p>This report assesses disruptive 5GC suppliers and is complemented by a separate report focused on 5GC solutions sourced from traditional mobile network suppliers, noted in the Additional Competitor list below.</p> |

Rated Competitors

- Affirmed UnityCloud, part of Azure for Operators
- Casa Systems Axyom 5G Core
- Samsung 5G Core
- Mavenir Converged 5G Packet Core

| Buying Criteria | Weight | Affirmed | Casa | Mavenir | Samsung |
|--|-------------|---------------|---------------|--------------------|--------------------|
| Architecture | 15% | Leader | Very Strong | Very Strong | Very Strong |
| Access Technologies | 10% | Very Strong | Very Strong | Very Strong | Very Strong |
| Performance | 10% | Very Strong | Very Strong | Very Strong | Very Strong |
| Management & Automation | 15% | Leader | Strong | Very Strong | Very Strong |
| Service & Support | 15% | Very Strong | Strong | Strong | Very Strong |
| Marketing and Product Scope | 10% | Leader | Strong | Very Strong | Very Strong |
| Market Momentum | 10% | Leader | Strong | Very Strong | Strong |
| Cloud Support | 15% | Leader | Strong | Strong | Strong |
| Overall | 100% | Leader | Strong | Very Strong | Very Strong |
| Score | | 4.65 | 3.35 | 3.70 | 3.75 |
| Note: Score of 1-1.49 = Vulnerable/1.50-2.49=Competitive/2.50-3.49=Strong/3.50-4.49=Very Strong/4.50-5=Leader) | | | | | |

Additional Competitors

- Cisco
- Ericsson
- Huawei
- Metaswitch
- NEC
- Nokia
- ZTE

Changes Since Last Update**Affirmed Networks:**

- **June 2021:** AT&T announced it will move its 5G mobile network to the Microsoft cloud, providing a path for all of AT&T's mobile network traffic to be managed using Microsoft Azure technologies. The companies will start with AT&T's 5G core and bring existing and future network workloads to "Azure for Operators".

Casa Systems:

- **December 2021:** The Telecom Infra Project (TIP) Fixed Broadband (FiBr) Project Group released the results of the multi-operator Open Broadband Network Gateway (OpenBNG) focused RFI, Casa Systems was short listed as meeting operator requirements.
- **October 2021:** Casa announced that Mediacom Communications selected its evolved packet core (EPC) and fixed wireless access (FWA) solutions to extend high-speed services to underserved homes and businesses in remote communities.
- **August 2021:** Casa announced an exclusive agreement with Bell Canada to provide new 5G Sub-6 High-Gain Outdoor consumer premise equipment (CPE) for Bell's Wireless Home Internet service. Focused on bringing the next generation of broadband access to customers in small towns and rural communities.

**Changes Since
Last Update
(cont.)**
Mavenir:

- **January 2022:** Mavenir Study reveals moving to converged 5G packet core can reduce operator TCO by up to 36%.
- **January 2022:** BAI Communications partners with Mavenir to deliver Sunderland's smart city project, powered by the vendor's MAVedge solution which includes Open vRAN and 5G packet core solutions.
- **November 2021:** Deutsche Telekom Rolls Out 5G on Kubernetes with partner Weaveworks using Mavenir's 5G cloud-native application lifecycle management.

Samsung:

- **January 2022:** Samsung noted a new win in Japan, with an undisclosed operator, for a private 5G core network.
- **January 2022:** Samsung noted a new win in Canada, with an undisclosed operator, for a 5G core network.

MARKET ASSESSMENT

The market for 5G mobile core (5GC) solutions, sourced from alternative suppliers, has grown significantly, made possible partly due to the rigorous standards developed by organizations such as 3GPP and ETSI, as well as forums such as ONAP and the O-RAN Alliance. Progress has also accelerated because of the maturation of cloud-native, microservices, hybrid cloud services, common databases, and a tranche of open source software solutions and applications, driven by the Cloud Native Computing Foundation (CNCF). Automation and AI have also matured and now support continuous innovation, continuous deployment (CI/CD) and automated operations. Automation is crucial to manage the many complexities of designing and managing cloud-native networks. Vendors can leverage very capable open source PaaS toolsets (e.g., ELK Stack, Grafana, Kibana, listo, Envoy, and many others) in their solutions to align with operator preferences for openness and provide effective management and automation of the network infrastructure and service delivery.

Mobile core solutions have completed their transition to network virtualization, but concerns over efficiency and scaling has prompted a further transition from virtual machine-based functions (VMs) to container-based functions (CNFs). CNFs promise to deliver massive scaling, greater efficiency, and improvements in reliability. The current "containerization" state of the art is embodied by combining Docker and Kubernetes; Docker is a containerization platform, and Kubernetes is a container orchestrator.

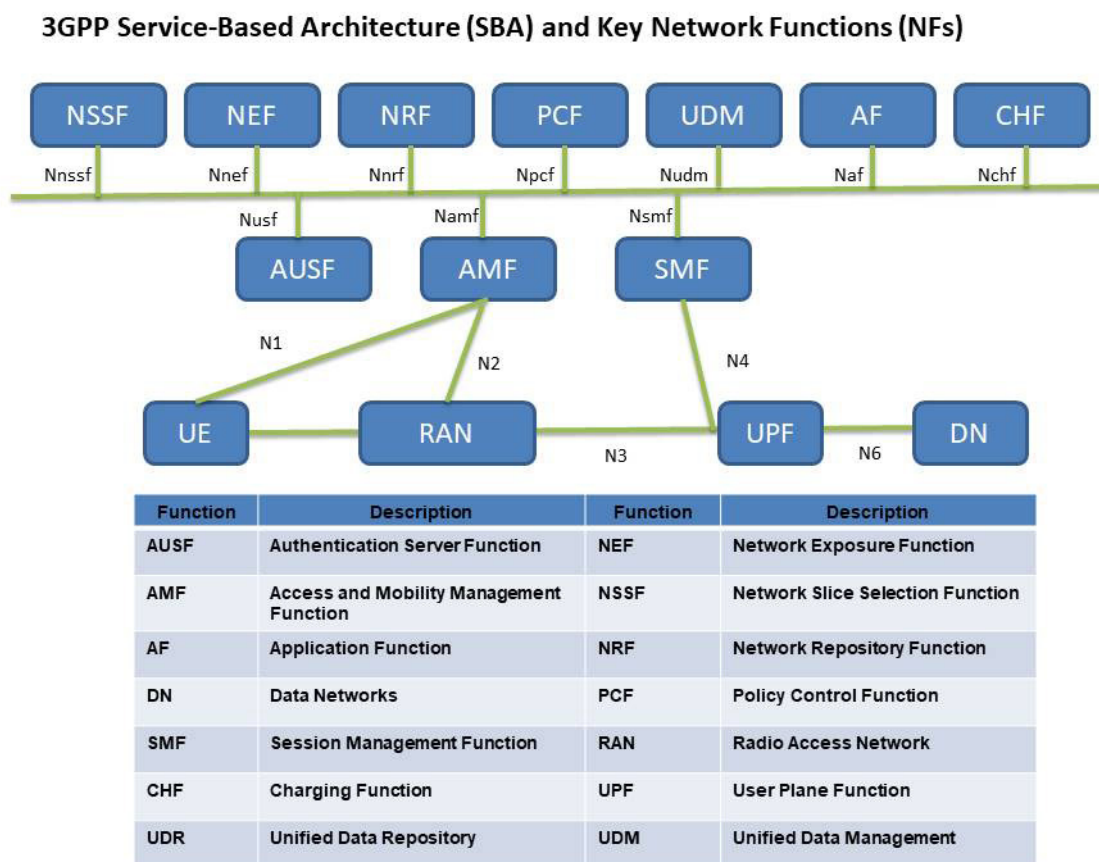
Software companies have been gaining ground with cloud-native solutions that can provide unique value-add (networking software, IP expertise, etc.); leverage their adjacent market strengths and success (IMS, SBC, IoT, RCS); and integrate open source components to offer a complete mobile core solution. Vendors that have played a role in 4G/LTE (mobile core or Gi-Lan) are leveraging their existing operator engagements to support 5G NSA deployments and capture eMBB and FWA services, while preparing the operator for full 5G SA deployments to expand the types of use cases supported, commercial SA deployments are beginning to ramp in 2021.

The primary market challenge for disruptors comes from incumbent mobile network suppliers that have made architectural transitions (from virtualization, followed by cloud-native) and are providing migration strategies that help network operators preserve 4G (and often 2G/3G) revenues while preparing for 5G. Incumbent operators generally need a step-wise progression to balance revenue- growth- investment priorities, but "greenfield" opportunities can move forward without the added burden of legacy service support. Vendors covered in this assessment claim multiple trials, PoCs and demonstrations with operators on a global basis. Several that have prior engagements with operators find themselves well positioned in the market technically as well as in their go-to-market strategies.

Mobile operators including Tier 1 and greenfields such as Rakuten and DISH Networks, have launched standalone (SA) 5G core network deployments. The GSA's NTS Snapshot, January 2022, notes that there are 99 operators who are investing, and 20+ operators have launched public 5G SA networks. Deployment of private 5G networks is ramping rapidly. As of November 2021, the GSA noted about 775 organizations are known to be deploying LTE or 5G private mobile networks or are known to have been granted a license suitable for the deployment of a private network. There are additional deployment models using unlicensed spectrum, such as CBRS (in the US) which furthers 5G deployments.

The market opportunity is global, with vendors noting engagements in all geographic regions and for multiple use cases. This reinforces the overall market enthusiasm for 5G as the primary vehicle to drive communications into the next era.

The following diagram provides a high-level view of the 5GC with the SBA and NFs.



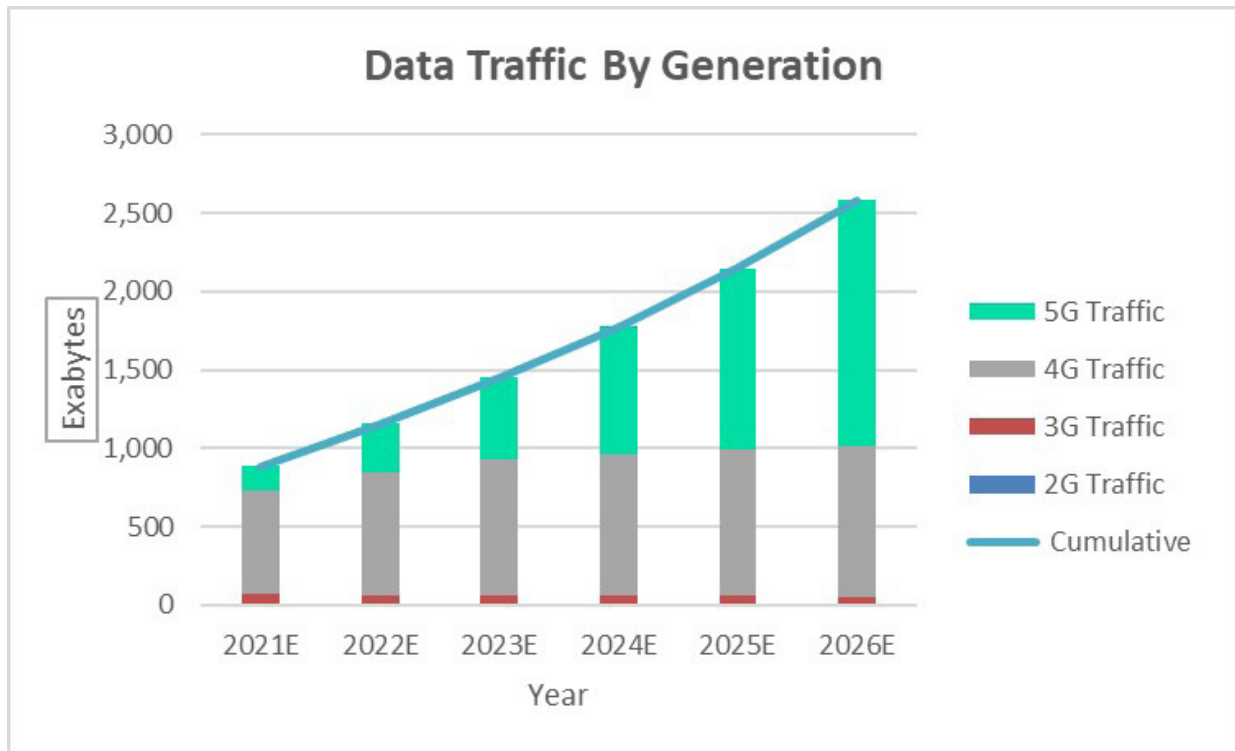
Source: Derived from 3GPP

MARKET DRIVERS

Transition to Cloud-native Technologies: The market demands a service-based architecture (SBA) as defined by 3GPP, implemented with cloud-native technologies including microservices and cloud-native open source functions (CNCF); deployable on public, private, or hybrid clouds; end-to-end lifecycle management (CI/CD); and support for rapid service innovation. The move to cloud-native is a prerequisite to 5G SA.

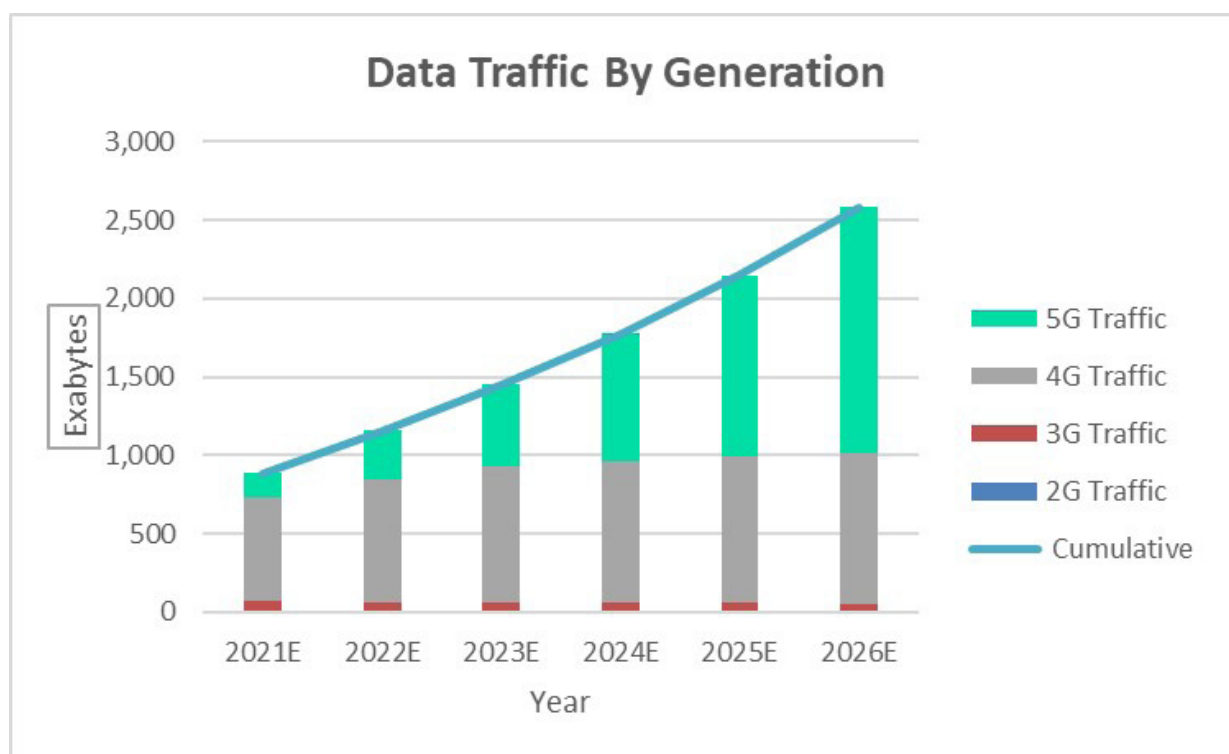
Performance and Scalability: Solutions need to range in scale from a single server (to support edge-based use cases) to very high scale (for central office/data center) locations. High throughput and capacity per server are key metrics for lowering costs. Also, low latency and stringent timing are needed by many 5G SA use cases (telemedicine, Industry 4.0, etc.). Industry 4.0 drives the need for automation in manufacturing and other applications including wireless connectivity for IoT, industrial IoT, edge computing, and AI.

Support 4G, 5G, and FWA Services: 4G traffic will be the majority of mobile traffic throughout most of this decade; however, by 2026 5G traffic will grow to represent approximately 61% of total traffic, while 4G will represent 37%, dropping from 76% in 2021, according to GlobalData's Mobile Broadband Forecast, December 2021 forecast report. The overall traffic increase by 2026 is projected to be nearly three times that of 2021. The need to expand coverage drives the use of FWA, (using CBRS, mmWave), WiFi, and other new spectrum bands. Operators are driving vendors to support all traffic generations with a converged core to reduce operational complexity.



Source: GlobalData Global Mobile Broadband Forecast December 2021

Monetize Enterprise (B2B) Services: Enterprise services, beyond connectivity, are a significant opportunity for operators to grow their top line revenues with highly profitable services. This drives the network to provide services based on the needs of the application (i.e., low latency, high throughput, local compute, monitoring and network insights). This also helps operators compete with OTT players that have successfully monetized high-value traffic in earlier generations. As noted in the graphic below, 5G offers the potential for higher revenues, but requires service agility.



Source: GlobalData Global Mobile Broadband Forecast December 2021

Multi-cloud: 5G core solutions will need to be cloud agnostic since each operator/enterprise will want a choice of which cloud to place workloads; however being cloud agnostic is only part of the story, solutions will need to seamlessly support multiple clouds to provide the flexibility necessary to meet customer expectations and provide the economics, performance and security that matches the service criteria.

Management and Automation: Effective management and orchestration solutions are needed to support rapid turn-up of services, provide service innovations, and deliver network insight. Operators are looking for standard tool sets (CNCF) augmented by vendor-developed tools to effectively manage the network and all deployed services. Operators appear to be moving rapidly from vendor-specific and/or in-house proprietary toolsets.

BUYING CRITERIA

Architecture: The basis for all 5GC solutions is a service-based architecture (SBA) coupled with cloud-native technologies such as support for containerized workloads, a common data repository for all information, and stateless NFs to support scaling and reliability. 3GPP Release 16, has defined the Service Communication Proxy (SCP) to address issues related to traffic routing, prioritization, overload control, load balancing, and interworking. This metric addresses the completeness of the solution with respect to CNCF components, the maturity of the databases, and support for containers as well as continued VM support. Additional weight is given to the microservices model when VM based network functions are further disaggregated into microservices, where each can be autonomously released.

Performance and Scale: Performance and efficiency are primary requirements; solutions must be configurable ranging from a single server for edge deployments to massive multi-server data center locations. The throughput per server becomes a driving factor in CapEx. Multiple vendors have provided metrics related to throughput, an average of 412 Gbps to a maximum of 524 Gbps per server. 5G core solutions also need to support a broad range of scaling options, from large telco central and regional offices to edge and far edge deployments as well as pre-packaged/pre-integrated solutions to reduce deployment complexity and time-to-market.

Access Technologies Supported: The mobile core needs to support a broad range of access technologies including: multiple generations of mobile access (5G, 4G, 3G, and 2G), in addition regulators have allocated new spectrum for private network usage which operators and enterprises will want to leverage, this includes CBRS for North America and mmwave. Operators will also want to leverage wireline access such fixed access (FA) in order to provide additional bandwidth to meet 5G service needs.

Automation: The 5G network's operational environment must be configured and managed to deliver the required services. Automation is key to simplify network configuration management and operation and maintenance (i.e., OAM), and to configure end user services. Standalone open-source components are preferred in the PaaS layer for monitoring, database, metrics, logs lifecycle management, and service mesh, so operators can leverage the best of the available technologies.

Service and Support: Vendor-supplied professional services are required to facilitate deployment. Tier 1 operators may have the staff and technical expertise to design and deploy their networks; however, smaller operators and vertical market segments may require assistance from vendors and system integrators on how to effectively implement. A vendor's partner ecosystem plays a role in providing adjacent product/solution expertise; especially when addressing vertical market opportunities that require in-depth knowledge of use case requirements.

Cloud Support: Telecom operators need to offer a wide range of services and leveraging the cloud can provide an efficient and affordable solution to deliver cost effective services. Users will demand choices and support for multiple cloud-centric business models. The cloud enables operators to climb the value chain by providing services that leverage their private cloud and use public clouds based on use case and user preference. Multi-cloud requires support for a mixture of public and/or private clouds. The operator can act as broker and establish the commercial relationships to make it easy for users to choose the desired cloud for their applications, without separate complex multi-cloud commercial agreements.

Marketing and Product Scope: The marketing and product scope criteria looks at the vendor's go-to-market approach, use case focus, and key technical alliances and types of engagements it brings to bear, considering the types of use cases pursued, such as greenfield, private network, core modernization, etc. Establishing a strong ecosystem is key to penetrating vertical markets which require unique knowledge associated with the use cases.

Market Momentum: This is an important metric to determine the appeal of the vendor's commercial 5GC solution. The metric evaluates the number of 5G contracts that involve the mobile core and the range of engagements such as the number of use cases, industry focus- eMBB, massive IoT, mission-critical IoT, and FWA. Deployed solutions with named operators carry additional weight. Currently vendors are noting trials and limited deployments as operators prepare to ratchet up their commercial offers.

VENDOR RECOMMENDATIONS

Affirmed Networks: Affirmed needs to stress the maturity of its cloud-native technology, its cloud-neutral stance and its ability to deliver any combination of private and public cloud services - either PaaS or IaaS models (i.e., multi-cloud). Affirmed can capitalize on the early adoption of its vEPC, Gi-LAN, Cloud Edge, IoT, and highlight new UnityCloud deployments. It must promote its ability to facilitate emerging B2B and vertical market applications and highlight key customer momentum, such as its wins at DNA, Inventec, CHT, AT&T, DNA, Netmore, and Milicon. It should stress performance (400G/server), agility (CI/CD) to shorten time-to-service, and the maturity of its "out-of-the-box" KPIs to ensure smooth operation and provide insights into upgrades and quality of experience (QOE).

Casa Systems: Casa should leverage its vBNG customer base and highlight its deployment flexibility and range of performance (single CPU implementation and tests showing throughput of 422 Gbps on COTs servers). Casa should continue to focus on FWA and cable-based wireless service opportunities, and tout its ecosystem partners that bring ORAN and broadband expertise, at multiple layers of the network to garner support for its 5GC and related software components.

Mavenir: Mavenir needs to maintain its visibility in key 5G market initiatives including private networks and cloud-based services and capitalize on its leading position in Open RAN. Mavenir should continue to highlight its cloud-native portfolio positioning and stress that it is the partner of choice for CSPs and SIs to deliver on new 5G use cases. Mavenir should tout successful engagements with operators and integrators such as NVIDIA, MobileEdgeX, Telefonica, Deutsche Telekom, and others which demonstrate its ability to deliver advanced 5G solutions. Mavenir should further stress its support for edge-based services in support of low latency applications, and to offload high bandwidth applications.

Samsung: Samsung should highlight the completion of its 5GC SA interoperability with a Korean commercial network, and should help it capture operator opportunities abroad by highlighting its cloud-native 5G core like (e.g., its recent 5GC win in Canada). Samsung should highlight its engagement in select vertical market opportunities, like autonomous driving, smart factories and farms, and AR/VR services. Samsung should also leverage its momentum in Open RAN to drive its 5G core opportunities. Samsung should ramp up its marketing efforts around 5G core, which has been overshadowed by Open RAN in recent months.

BUYER RECOMMENDATIONS

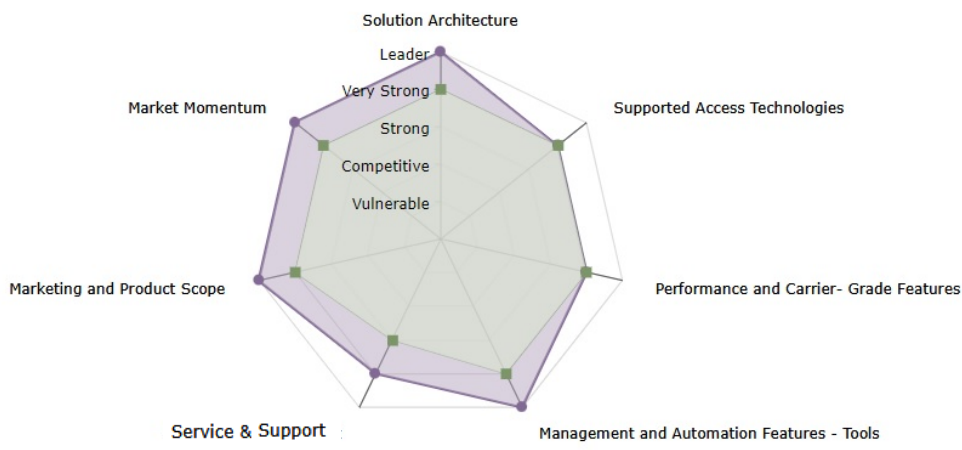
Evaluate Alternative Suppliers: Operators facing a mobile network refresh or considering adding mobile services to their portfolios should also evaluate alternative suppliers for their 5G mobile core and compare specific use case needs against vendor solutions; not all vendors will be best at all scenarios. Operators should consider targeting vertical markets with pre-integrate/pre-configured core- RAN solutions that address their operational needs and reduces deployment times.

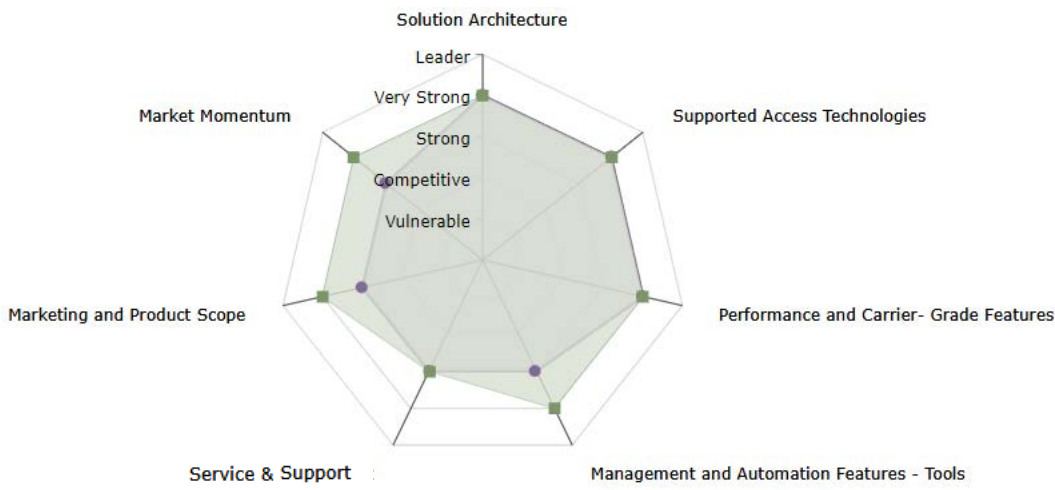
Evaluate Automation Capabilities: Automation is a key component of any mobile network infrastructure solution. Although most vendors are leveraging open source tools and functions, some are integrating with in-house developed processes (dashboards, probes, and insights) to provide a complete solution to manage and control network operation. Automation considerations should include lifecycle management, telemetry, network visibility, and exposure of key network KPIs.

Evolve with the State-of-the-Art: The technologies being developed are advancing quickly; operators should ensure that their selected solutions are modular and interchangeable to adapt to new capabilities (like AI/ML) to leverage the state-of-the-art as it evolves. Operators should press vendors on the degree of cloud-native and open-source technologies that are used in their 5G core solutions, and plans support advanced 5G services.

RATED COMPETITORS

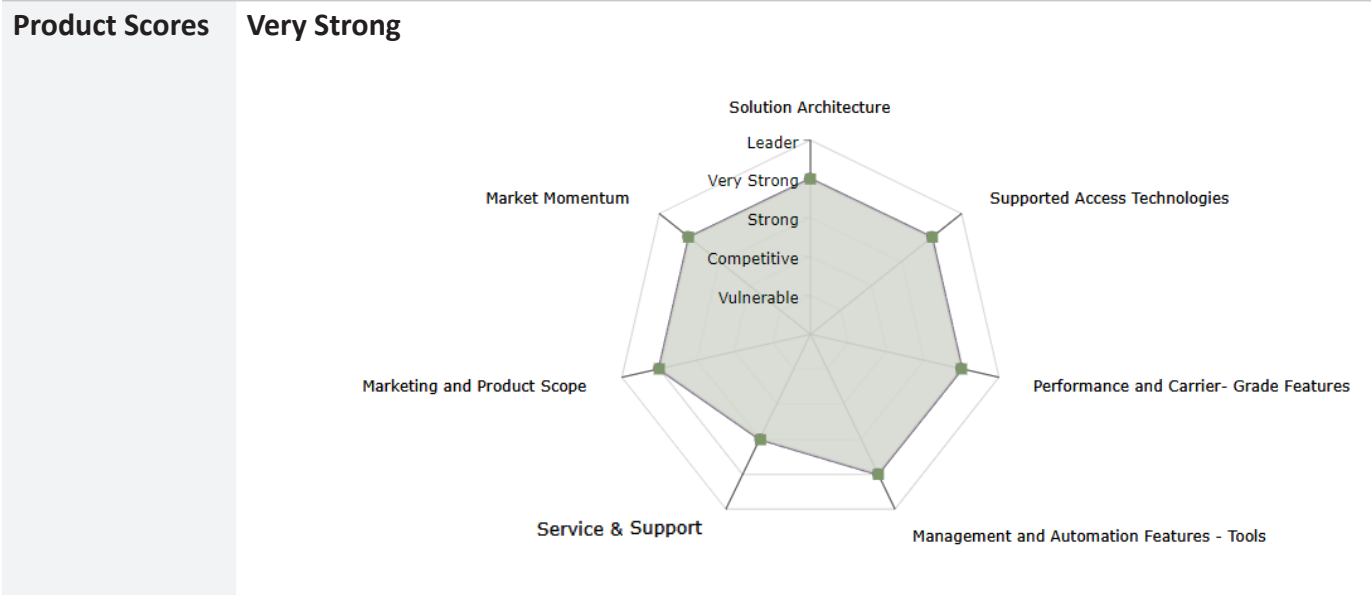
| | |
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| Product Name | Affirmed UnityCloud, part of Azure for Operators |
| Current Perspective | <p>Affirmed’s UnityCloud 5G core solution addresses the current and future requirements of 5G networks and is built on a cloud-native and microservices foundation to improve network economics by providing an NFVI agnostic architecture and low TCO. As a key component of Microsoft’s “Azure for Operators” portfolio, UnityCloud benefits from being highly integrated and optimized to support Azure public and edge cloud infrastructures including bare metal, Openshift, and VMWare. UnityCloud maintains open APIs and continues to demonstrate wide support across popular cloud environments, but has unique access to Azure infrastructure to optimize the right workloads in the right places. UnityCloud follows 3GPP standards and uses open-source components for its PaaS layer, which is integrated and automated to respond to changing market needs. UnityCloud provides an operations and policy manager (OPM) that automates, creates policies, and can run services in the core, at the edge, or in a public, hybrid, or private cloud environment to meet service delivery needs. UnityCloud continues to grow it’s out of the box KPIs to provide accuracy and baseline thresholding for network health, performance and scalability metrics, while delivering insights for upgrades / downgrades and end user QOE. As part of Microsoft’s Cloud Business unit, giving Affirmed a broad addressable market.</p> |
| Buying Criteria Rating | <p>Management and Automation Features - Tools</p> <ul style="list-style-type: none"> • Leader <p>Market Momentum</p> <ul style="list-style-type: none"> • Leader <p>Marketing and Product Scope</p> <ul style="list-style-type: none"> • Leader <p>Performance and Carrier- Grade Features</p> <ul style="list-style-type: none"> • Very Strong <p>Service & Support</p> <ul style="list-style-type: none"> • Very Strong <p>Solution Architecture</p> <ul style="list-style-type: none"> • Leader <p>Supported Access Technologies</p> <ul style="list-style-type: none"> • Very Strong |

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|------------------------------|---|
| <p>Product Scores</p> | <p>Leader</p>  |
| <p>Strengths</p> | <ul style="list-style-type: none"> • UnityCloud is being deployed multiple telco networks for vEPC, Gi-Lan and for private network applications. UnityCloud’s cloud-native technology base, which began with 4G/LTE, separates it from some newcomers just entering the market. • UnityCloud is integrated with multiple cloud providers, including AWS and Azure, providing MNOs and enterprises freedom of choice. • UnityCloud was GA in October 2019 and supports combo-mode network functions (VNFs and CNFs), for legacy 4G/LTE and 5G-ready features, respectively; field proven solutions help minimize deployment risks for CSPs. • UnityCloud’s microservices model, which disaggregates VM functionality into individually updatable microservices, provides service agility, granularity of services and openness to support 5G SA use cases. • Affirmed is part of Microsoft’s Cloud Business Unit, giving it the financial backing and access to very broad markets; the stability and breadth of presence differentiates Affirmed from smaller competitors with less R&D and marketing resources. |
| <p>Limitations</p> | <ul style="list-style-type: none"> • Microsoft’s acquisition has been positive from a funding perspective but could dilute its laser focus on mobile core solutions. • Affirmed, as part of Microsoft’s Cloud business unit, may be challenged to maintain a cloud-neutral stance regarding third party clouds, at least from a perception standpoint. |

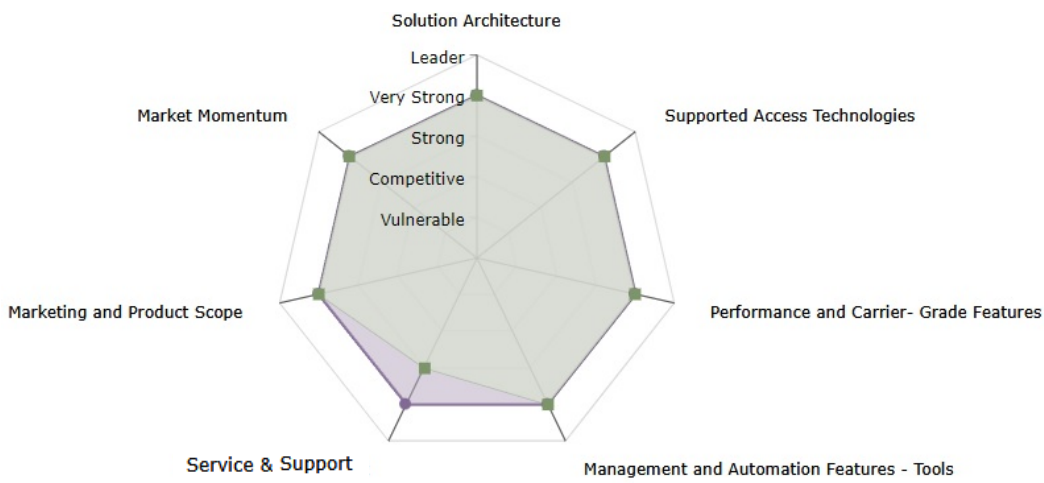
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| Product Name | Casa Systems Axyom 5G Core |
| Current Perspective | <ul style="list-style-type: none"> • Casa’s ultra-broadband solution, Axyom Software Framework, provides common set of cloud native, K8S containerized microservices to deliver web-scale, superior performance, flexibility, robustness, and scale to leverage its routing, session/slice management, and secure microservices across 4G/5G wireless, trusted and untrusted non-3GPP (N3IWF and TNGF), and FWA slice types. Its service-based architecture accelerates service velocity eliminating the need for provisioning of point-to-point interfaces between network functions. Casa’s “lean” Axyom VNF an CNF workloads are suitable for low latency edge computing with reduced consumption of virtual compute and memory resources. Support is provided for network slicing in 5G service-based architecture (SBA). • Casa’s Small Cell Core includes HeNB/ HNB gateways, SeGWs, ALF and the VMC. These VNFs can be deployed on bare metal, as virtual machines, or in containers. |
| Buying Criteria Rating | <p>Management and Automation Features - Tools</p> <ul style="list-style-type: none"> • Strong <p>Market Momentum</p> <ul style="list-style-type: none"> • Strong <p>Marketing and Product Scope</p> <ul style="list-style-type: none"> • Strong <p>Performance and Carrier- Grade Features</p> <ul style="list-style-type: none"> • Very Strong <p>Service & Support</p> <ul style="list-style-type: none"> • Strong <p>Solution Architecture</p> <ul style="list-style-type: none"> • Very Strong <p>Supported Access Technologies</p> <ul style="list-style-type: none"> • Very Strong |
| Product Scores | <p>Strong</p>  |

| | |
|----------------------------|---|
| Strengths | <ul style="list-style-type: none"> • Casa's 5G core solution delivers high throughput per server, and supports a greater number of sessions per vCPU than competing solutions; Casa currently reported the second highest throughput per server at 422 Gbps. • Casa provides multiple (specialized) overlay cores optimized for specific use cases, including a C-SGN for IoT/NB-IoT and small cell cores. Multiple core variants enable it to optimize and scale according to use case requirements. • Casa's heritage as a provider of broadband access and subscriber management solutions drives needed flexibility, efficiency, and high performance. Casa brings the strongest experience in the fixed access market to deliver a credible solution. • Casa's Small Cell Manager includes H(e)MS/HMS management for LTE and 3G small cells, hybrid SON, TR-069 auto configuration, and a Syslog with KPIs. Casa has the strongest position in the class to support fixed access. |
| Limitations | <ul style="list-style-type: none"> • Casa has not publicly announced 5GC engagements with service providers, but notes PoCs and trials; it needs to convert these to commercial deals. • Casa is addressing the highly competitive private network opportunity, which includes incumbents like Nokia as well as smaller providers. • The RAN side of the market, now that disaggregation and CBRS spectrum is commercially available, is also crowded, with vendors such as Affirmed and Mavenir. |
| Product Name | Mavenir Converged 5G Packet Core |
| Current Perspective | <p>Mavenir offers 5G core (5GC) applications that are decoupled and built independent of a platform, allowing NFs to run in any underlying CaaS/PaaS and IaaS layers. In addition, Mavenir has decoupled the 5GC NF application services from the common management services to provide a disaggregated and scalable packet core solution. Mavenir 5GC NFs can run on Kubernetes, Mavenir provided CaaS/PaaS, or customer defined CaaS/PaaS. NFs have been integrated with third-party CaaS/PaaS solutions including Red Hat OpenShift, VMware Tanzu, and AWS EKS and provides simplified FCAPS integration (using open APIs) between the 5GC NFs and the northbound Observability Framework (OBF) and OSS/BSS systems.</p> <p>Mavenir's solution is SBA-based, cloud-native, and uses AI/ML to support network scaling. The solution supports network slicing and can be deployed as an enterprise service, dedicated network slice or non-public network (NPN) in an efficient small footprint server configuration. Mavenir also supports a CI/CD DevOps based software release and upgrade cycles to reduce time to market, cost, and integration complexity. The solution is also access agnostic and caters to all types of access (3GPP, non-3GPP) allowing seamless interworking improved operational efficiencies.</p> <p>Mavenir is also active in vRAN and Open RAN initiatives, where its evolved RAN architecture, designed with cloud-native virtualization techniques, enables the RAN to adapt based on usage and coverage.</p> |

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| <p>Buying Criteria Rating</p> | <p>Management and Automation Features - Tools</p> <ul style="list-style-type: none"> • Very Strong <p>Market Momentum</p> <ul style="list-style-type: none"> • Very Strong <p>Marketing and Product Scope</p> <ul style="list-style-type: none"> • Very Strong <p>Performance and Carrier- Grade Features</p> <ul style="list-style-type: none"> • Very Strong <p>Service & Support</p> <ul style="list-style-type: none"> • Strong <p>Solution Architecture</p> <ul style="list-style-type: none"> • Very Strong <p>Supported Access Technologies</p> <ul style="list-style-type: none"> • Very Strong |
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| | |
|----------------------------|--|
| Strengths | <ul style="list-style-type: none"> • Mavenir has strong ties with operators and can leverage its 5GC product adjacencies such as IMS and messaging to gain traction. • Mavenir can leverage established engagements with operators such as Dish Networks, T-Mobile, and Vodafone to provide RAN hardware and software. • Mavenir is highly visible in the Open RAN Policy Coalition to bring open and interoperable solutions to the RAN; Mavenir can leverage this momentum to further its 5G core for edge and far edge presence for RAN control. • Mavenir utilizes cloud-native technologies and interworks with legacy protocols which positions it well to help operators transition their legacy 2G/3G/4G services onto a common converged packet core. • Mavenir notes support for multi-cloud, one of two supporting all three major clouds. |
| Limitations | <ul style="list-style-type: none"> • Mavenir has not named all operators who are using its 5G core in trials or commercial deployments, noting NDA requirements. • Momentum for Open RAN is building, giving Mavenir a foothold with supporting operators (like Dish Networks), but it may take some time to transition from trials to significant deployments. |
| Product Name | Samsung 5G Core |
| Current Perspective | <p>Samsung has collaborated with multiple operators and partners to create 5G core solutions and to expand the 5G ecosystems through participation the Cloud Native Computing Foundation (CNCF) and Open Network Automation Platform (ONAP), as well as leverage its early 5G NSA experience with Korean operators.</p> <p>Samsung's 5G core helps operators launch and maintain new services uses a microservices architecture, dynamic orchestration and automation, CI/CD, open source platform services, and telco-grade performance (session continuity and redundancy) which can scale from small to large capacity and enable operators to deploy 4G, 5G NSA, or 5G SA on a common architecture. Samsung's compact core solution ("All in One Box") enables deployment and efficient operation of private 4G and 5G networks for enterprises. Close collaboration with Intel helped optimize packet processing to deliver a high-performance user plane. Samsung 5G core solution uses container-based Kubernetes and Docker, and provides a multi-cloud platform support with Windriver, OpenShift, and VMWare. This approach allows developers to focus more on 5G Core NF development, while operators can improve their network operational efficiency and create new revenue streams by opening new B2B and B2C services. This approach allows developers to focus more on 5G core NF development.</p> |

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| <p>Buying Criteria Rating</p> | <p>Management and Automation Features - Tools</p> <ul style="list-style-type: none"> • Very Strong <p>Market Momentum</p> <ul style="list-style-type: none"> • Very Strong <p>Marketing and Product Scope</p> <ul style="list-style-type: none"> • Very Strong <p>Performance and Carrier- Grade Features</p> <ul style="list-style-type: none"> • Very Strong <p>Service & Support</p> <ul style="list-style-type: none"> • Very Strong <p>Solution Architecture</p> <ul style="list-style-type: none"> • Very Strong <p>Supported Access Technologies</p> <ul style="list-style-type: none"> • Very Strong |
| <p>Product Scores</p> | <p>Very Strong</p>  |
| <p>Strengths</p> | <ul style="list-style-type: none"> • Demonstrated market momentum and operational experience- via Korean telco operators (e.g., KT) beginning to deploy 5G SA. • Strong momentum in vRAN, with commercial carrier-grade, 5G vRAN, well positioned to promote 5G Core. • Open-source PaaS plus the Samsung Cloud Orchestrator (SCO) provides an effective automation platform for 5G use cases. • Provides multi-cloud support (AWS, Azure, and Google), giving operator choice of cloud providers, one of two to support all three clouds. |
| <p>Limitations</p> | <ul style="list-style-type: none"> • Samsung has relatively limited 5GC SA presence outside of the Korean telco market. • Momentum for ORAN is building, but it may take some time to transition from trials to significant deployments. • Samsung’s 5G SA core was recently released (GA- Q1 2021), trailing competitors. |