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January 02, 2025

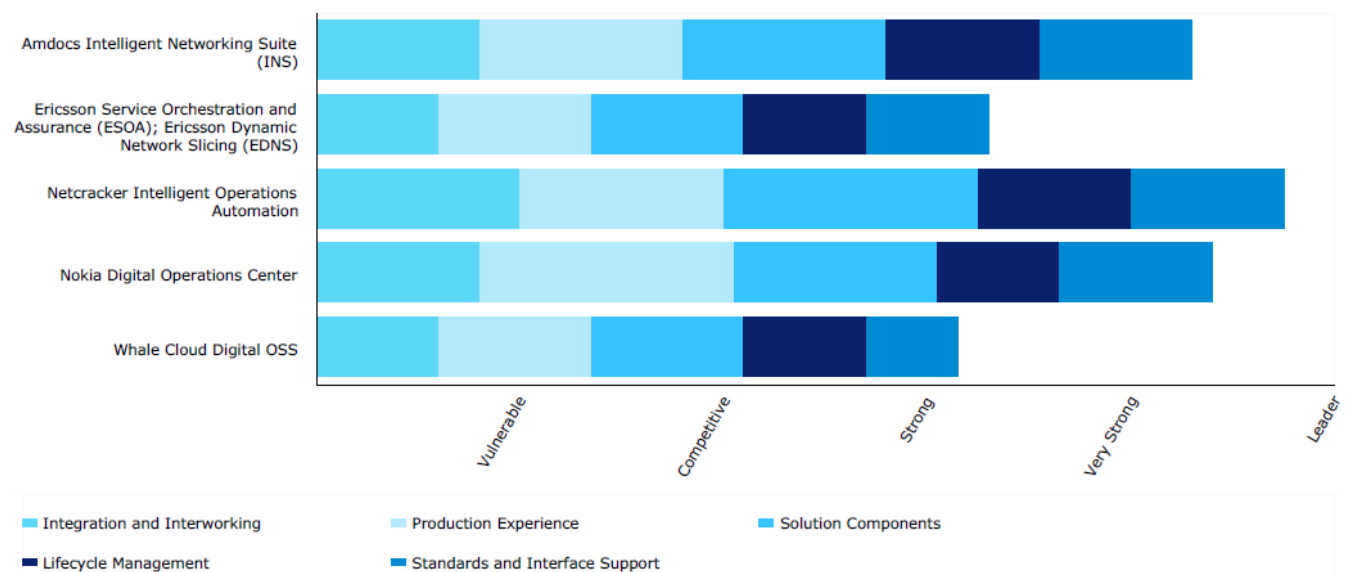
Network Service Orchestration: **Competitive Landscape Assessment**

Competitive Landscape Assessment - Network Service Orchestration

Report Summary:

A fast-developing and hotly contested area of telecoms IT, network service orchestration is improving its intent-based orchestration and resource inventories, all while coming to terms with the push for autonomous networks.

Product Class Scorecard



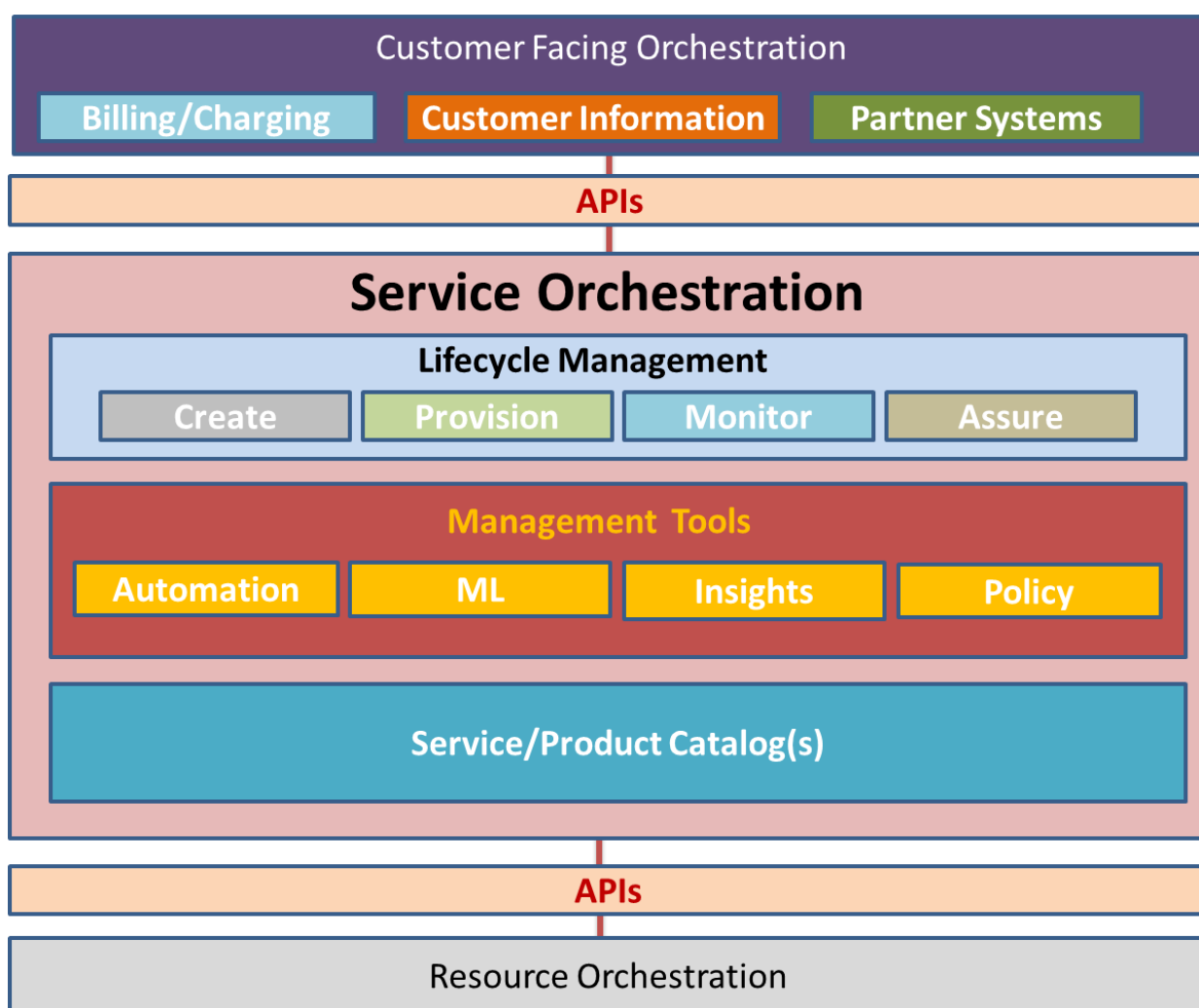
Market Overview

Product Class	Network Service Orchestration (NSO)	
Market Definition	<p>This report covers vendor products and solutions that address lifecycle management of services that comprise virtualized, cloud-native, and sometimes physical network resources. NSO enables carriers, their partners, and their customers to design services that meet precise performance specifications, often defined in a service-level agreement (SLA) between the operator and the customer. Assuring the performance of these services within SLA specifications in an end-to-end manner is vital to NSO, as is the automation that enables closed-loop orchestration. NSO is essential for the dynamic network slicing required by standalone 5G.</p> <p>Northbound, NSO works with BSS and other customer-facing systems. Southbound, it works with the network resource orchestration layer, which coordinates domain controllers, NFVO, and other lower-level functions to allocate and manage network resources required by the service over its lifecycle.</p> <p>Note: GlobalData's Network Resource Orchestration report is a companion piece to this document.</p>	
Rated Competitors	<ul style="list-style-type: none"> • Amdocs Intelligent Networking Suite (INS) • Ericsson Service Orchestration and Assurance (ESOA); Ericsson Dynamic Network Slicing (EDNS) • Netcracker Intelligent Operations Automation • Nokia Digital Operations Center • Whale Cloud Digital OSS 	
Additional Competitors	<ul style="list-style-type: none"> • Ciena Blue Planet • Cisco • HPE • IBM 	<ul style="list-style-type: none"> • Inmanta • Itential • DZS • Rakuten Cloud Native Orchestrator
Changes Since Last Update	<ul style="list-style-type: none"> • December 2024: This update adds Whale Cloud and removes Huawei from the vendor class. Both companies have adjusted their portfolio strategy to address evolving market preferences in their home market in China. • June 2024: Netcracker launched Netcracker Digital Satellite Solution, which enables orchestration of services in LEO and GEO constellations. The solution also contains BSS and other enabling capabilities for satellite services. • January 2024: Amdocs launched its end-to-end service orchestration solution, which contains Amdocs Intelligent Network Suite as well as other components to provide complete capabilities for services like SD-WAN and network slicing. The solution contains the assurance assets acquired from Teoco in 2023. • December 2023: Saudi operator stc selected Nokia Orchestration Center for network slice and IP-VPN orchestration. • December 2023: Ericsson and Digital Nasional Berhad (DNB) Malaysia completed a proof-of-concept engagement demonstrating full intent-based slice operations. Using Ericsson's technology, DNB allocated radio resources among the six operators using its shared national network. 	

Market Assessment

This competitive landscape assessment is one of two reports on orchestration in telecoms service environments. It follows the general industry consensus (though by no means unanimity) that there is a useful architectural boundary between lower-level resource orchestration and higher-level service orchestration. Network Resource Orchestration is the subject of a companion report; this report covers service orchestration.

Service orchestration encompasses the full, end-to-end lifecycle of network services made up not only of classic network functions, but of components that may come from service partners and/or are offered in public cloud environments. In addition, the rise of microservices and containers in telecoms infrastructure means that telcos must now manage multiple types of resources in their service environments: physical, virtualized (VM-based), and cloud-native. Those resources make up services that may execute on the edge, in the core, and/or in a cloud environment managed by another party.



Source: GlobalData.

While all network operators want to decrease the time and effort required to design and operate new services, 5G is bringing operators face-to-face with the need to create and manage services dynamically, and in far greater numbers than they are used to. They must be able to construct services rapidly, provision them easily, and assure and operate them reliably. Since each service will be underpinned by one or more network slices, lifecycle orchestration must extend to those slices as well.

As an architectural layer and software solution, service orchestration is still relatively new, and thus changes rapidly. Since the last update, the industry has reached more of a consensus on standards: In particular, TM Forum's APIs have largely become the standard for northbound integration with the monetization/customer information layer; while southbound interfaces to the resource orchestration functions are coalescing around ETSI's and MEF's architectures.

In 2024, the biggest network management topic was autonomous networks, which take a more resource-oriented approach to closed-loop network automation. The ultimate relation between autonomous networks and network service orchestration is still unclear, with some vendors and operators starting to conceive of service orchestration as more or less an application that runs on top of an autonomous networks platform, while others believe that it will remain an independent layer as pictured in the figure above.

A major area of innovation and differentiation in orchestration is currently the resource catalog and topology. Carriers and vendors alike now realize that real-time automated orchestration must have a near-real-time view of available network resources and their physical/logical arrangement in order to maintain service operations.

In their early deployments, both network service orchestration and autonomous networks are often limited to a single network domain - with transport being the most common example - service, or process family, and therefore also often a single infrastructure vendor. This can make it difficult to determine whether a vendor offers a truly resource-agnostic service orchestration layer, or whether it merely provides a full-stack silo for a particular domain. To be evaluated in this report, a vendor must show that its solution credibly handles service orchestration across multiple technology domains.

The rapid development of capabilities in this arena suggests that competition will remain intense for the next few years, and that any vendor evaluated in this report could be the best vendor for a given carrier's particular set of circumstances. GlobalData also expects that the 'leader' ranking will shift from update to update as technology matures.

Market Drivers

- **Slow Standalone Adoption:** Commercial deployment of network service orchestration has been slow, largely due to the slow uptake of 5G standalone. Without the ability to create and manage network slices dynamically, operators understandably do not make orchestration of those slices and related services a priority. As 5G standalone adoption increases, GlobalData expects higher adoption of service orchestration, subject, again, to the uncertainty about the interaction of service orchestration and autonomous networks.
- **Hybrid Resources:** Not only must a service orchestration solution be able to manage virtual, cloud-native, and ideally physical functions, it should also be able to orchestrate resources from across the operator's infrastructure as well as partner resources, including those from public clouds. As non-terrestrial networks integrate more closely with terrestrial networks, orchestration suites will need to incorporate satellite resources as well.
- **Intent-Driven Orchestration:** Intent-based orchestration assigns resources dynamically to maintain a specified level of performance. The gold standard here is declarative intent, where only the desired performance of the service is specified in design time and the system allocates resources in run time to maintain that performance. Imperative intent, where the resources are specified during design time to varying extents, is also currently used, but it should give way over time to declarative intent save for niche technical use cases.

- **End-to-End Visibility and Analytics:** To support this automation, any service orchestration solution must be able to monitor service performance in real time, and ideally track/report on service experience. Moreover, this monitoring should be on a per-user, per-service, per-device basis. This sophistication and granularity requires not only advanced data gathering and data models, but artificial intelligence as well.
- **Deployment Diversity:** Some early service orchestration projects are parts of large, complex, and professional services-heavy transformation engagements. While some operators require that kind of work, others are looking a more packaged, plug-and-play solution. Both models are necessary; neither will meet all of the market's needs.

Buying Criteria

- **Solution Components:** This category judges the breadth of a vendor's solution as if it were to be deployed as a single-vendor, best-of-suite silo. Partner components are included if they are integrated with the vendor's stack and offered as a single solution. It includes catalogs, data abstraction layers, data models, model-driven and intent-driven capabilities, assurance, analytics security, hybrid cloud management, and partner ecosystems.
- **Standards and Interface Support:** The first of two categories that assess deployment readiness: This criterion judges support of the industry-standard architectures, interfaces, modeling languages, and so on that are essential for smooth integration and to avoid vendor lock-in. Since the industry has yet to reach a consensus in many of these areas, this section evaluates support for standards from the TM Forum, MEF, ETSI, 3GPP, and other industry consortia.
- **Integration and Interworking:** The second of two deployment readiness categories: This category acknowledges that standards compliance is necessary, but it is not sufficient to handle the myriad mixes of legacy network elements in the global telecoms industry. It therefore evaluates the solution's ability to work with the diverse third-party products that make up a typical carrier network, covering northbound and southbound functions like policy control, monetization, and resource orchestration, but also assurance and analytics capabilities provided by other vendors.
- **Lifecycle Management:** This category evaluates the solution's ability to ease and automate the full lifecycle of the service, from design and testing to assurance. It also includes intent-driven orchestration, smart workload placement, and increasingly, low- and no-code capabilities.
- **Production Experience:** Since solutions mature by evolving to meet real-world conditions, this category evaluates customer numbers, PoCs/trials, a vendor's largest and most complex deployments, as well as the breadth of supported services and partner/third party resources.

Vendor Recommendations

- **Cross-Domain Boundaries:** While most vendors have built up orchestration credentials in a few network domains, all should strive to extend their expertise to adjacent domains in the race for full end-to-end service orchestration and autonomous networks. Satellite connectivity and services will be the key new domain to add here in 2025 and 2026.

- **Observability and Interactivity:** Increasing automation and services bring with them increasing numbers of adjustments made in real time. Carriers, therefore, increasingly need the ability to know what is going on in their infrastructure and to adjust it as needed. Vendors must provide both traditional reporting tools like dashboards as well as more interactive, natural-language capabilities. Generative AI (GenAI) will be the primary tool for these interfaces.
- **Tell a Monetization Story:** While most architecture diagrams place the monetization layer above the service orchestration layer, it is the latter's ability not only to automate service/slice operations, but to support quick and easy service creation that will enable operators to produce high-margin services. Vendors should therefore be able to provide specifics about how their orchestration supports service agility.

Buyer Recommendations

- **Press Vendors on Intent:** Intent-based orchestration still appears on marketing slides more than it does in production networks. Buyers should determine how each vendor's architecture defines, stores, and implements business intent. They should prioritize declarative intent over imperative intent.
- **Choose Your Openness:** This network transformation generation represents telcos' last, best chance to avoid vendor lock-in in their service infrastructure. While some operators will begin with a single-vendor orchestration deployment - after all, they have to start somewhere - operators should ensure that the vendor's interfaces and architecture match their evolution strategy, especially regarding interfaces with lower-level functions where there are still competing approaches.
- **Require Hyperscaler Support:** While the integration of public clouds and telco networks is progressing, the eventual need to integrate SaaS workloads and cloud domains is inevitable. Build hyperscale service components, data management, multicloud management, and similar capabilities into your RFPs.

Rated Competitors

Product Name	Amdocs Intelligent Networking Suite (INS)
Current Perspective	<p>Amdocs INS provides end-to-end service management capabilities covering design, inventory, assurance, and orchestration. Separately salable components include Amdocs Network Design, Amdocs Service Orchestration, Amdocs Network Orchestration, Amdocs Network Inventory, and Amdocs Service Activation.</p> <p>Amdocs INS' inventory component is full-featured, allowing modeling of the future state as well as a current view of resources. Amdocs is investing heavily in autonomous networks and AI. Its traditional strength in BSS produces robust-related capabilities in service marketplaces and policy.</p> <p>Amdocs is delivering some complex and sophisticated transformation projects for leading service providers that include cross-domain orchestration including satellite, hybrid PNF/VNF/CNF orchestration, and integration with customer-facing systems. The Helix assets that Amdocs acquired from Teoco have strengthened its real-world ability to integrate with multivendor systems. Amdocs has diverse experience with RAN networks, hyperscale resources, fixed, and satellite networks. Amazon Web Services (AWS) Telco Network Builder is based on Amdocs technology.</p>

Buying Criteria Rating	Integration and Interworking Very Strong Lifecycle Management Leader Production Experience Very Strong	Solution Components Very Strong Standards and Interface Support Leader
Product Scores	Very Strong	
Strengths	<ul style="list-style-type: none"> Amdocs has made significant progress in RAN resource orchestration as well as workload placement, keeping it competitive with network equipment providers. Amdocs focuses strongly on robust support for industry standards, pitching itself as more vendor-agnostic than service orchestration suites allied to proprietary hardware portfolios. Amdocs has solid experience in hyperscale support, orchestrating production deployments on both Microsoft Azure and AWS. 	
Limitations	<ul style="list-style-type: none"> Amdocs' design-time treatment of intent setting is a robust form of imperative intent. To keep pace with the industry, it will likely have to become more declarative over time. Amdocs has deep credibility in large and complex network transformation projects for major operators; to capture the broad middle of the market, it should build on the assurance customer base and multivendor connectors it acquired with Teoco Helix assets. Amdocs faces stiff competition in the resource inventory area; as networks increasingly require real-time, automatic adjustments, it will need to bolster its inventory to enable this performance. 	
Product Name	Ericsson Service Orchestration and Assurance (ESOA); Ericsson Dynamic Network Slicing (EDNS)	
Current Perspective	<p>Ericsson has rebooted its orchestration portfolio since the previous update of this report. ESOA remains as the company's main service orchestration product, but it is now more of a modular platform that can be configured for a variety of network types, e.g., core, transport, and/or RAN. Ericsson prices ESOA according to the network domains it supports.</p> <p>ESOA covers the full service lifecycle from design to assurance. Ericsson also sells EDNS, an add-on solution containing pre-integrated, production-ready slice management and assurance capabilities. ESOA's embedded common topology service, which is built on the company's active inventory, performs near-real-time discovery and reconciliation; it brings ESOA into the lead group of vendors regarding resource inventory and topology.</p> <p>Ericsson's rejuvenated orchestration portfolio has improved the company's lifecycle management score. Additional future deployments may well produce the experience to raise its scores for integration and interworking as well as production experience.</p>	
Buying Criteria Rating	Integration and Interworking Strong Lifecycle Management Very Strong Production Experience Strong	Solution Components Strong Standards and Interface Support Very Strong
Product Scores	Strong	

Strengths	<ul style="list-style-type: none"> Ericsson has a well-elaborated architectural vision, including improved intent-driven networking and smart workload placement. Ericsson has substantially improved its capacity for hybrid and multi-cloud management. Ericsson has well-developed testing and onboarding features. 	
Limitations	<ul style="list-style-type: none"> Ericsson has less practical experience integrating its orchestration offering with multivendor equipment than many of its competitors. Ericsson still has fewer production deployments than its main competitors, with some of its showcase deployments in the pre-deployment stage. Its contracts with giant global CSPs should improve its experience here over time. Ericsson trails in applying service orchestration to private/dedicated networks. 	
Product Name	Netcracker Intelligent Operations Automation	
Current Perspective	<p>Netcracker Intelligent Automation is fully microservice-based; these microservices can be decoupled and configured for each deployment to match a customer's environment and requirements. Focusing on end-to-end automation of services and network slices, Netcracker has embedded AI in its solution and supports a broad range of APIs and standards bodies. The company has orchestration experience across a variety of network types including, most recently, LEO satellite services, which place stringent demands on orchestration components including service and resource inventories as well as service assurance. It also has good experience orchestrating services in servco/netco relationships.</p> <p>Netcracker bolsters its solution with AI/ML capabilities including one of the class's more mature GenAI platforms, configurable self-service portals, domain orchestration capabilities across several network areas, out-of-the-box service definitions for many different enterprise services, and an enterprise services ecosystem.</p>	
Buying Criteria Rating	<p>Integration and Interworking Leader</p> <p>Lifecycle Management Leader</p> <p>Production Experience Very Strong</p>	<p>Solution Components Leader</p> <p>Standards and Interface Support Leader</p>
Product Scores	Leader	
Strengths	<ul style="list-style-type: none"> Netcracker's intent-based orchestration capabilities are more mature than many of its competitors' offerings. Netcracker's organically developed, unified code base avoids many of the deployment and speed problems associated with M&A-driven code diversity. Netcracker has among the most mature GenAI capabilities in the service orchestration class, providing interactive assistants for testing and operations. Netcracker has surrounded its offering with a full suite of ecosystem partners and preconfigured service templates. 	
Limitations	<ul style="list-style-type: none"> While Netcracker has a good mix of customer and project sizes as well as both brownfield and greenfield expertise, it has fewer of the largest network transformation deals than some competitors. After taking an early lead, Netcracker is now closer to the middle of the pack when it comes to hyperscale resources in orchestration. 	

Product Name	Nokia Digital Operations Center	
Current Perspective	<p>Nokia Digital Operations Center comprises three natively integrated but separately saleable and deployable products: Nokia Orchestration Center, Nokia Assurance Center, and Nokia Unified Inventory. Nokia Unified Inventory, which used only to be available bundled with one of the other two products, is now available as a self-standing product to address industry requirements for near real-time discovery and reconciliation.</p> <p>Nokia also continues to support its older orchestration product, Nokia FlowOne, but does not sell it to new orchestration customers.</p> <p>Nokia provides a strong creation and management interface, service templates, and the ability to modify slice resources and performance in real time. Nokia has broad experience in public cloud partnerships, and it also boasts mature capabilities in analytics and automation.</p>	
Buying Criteria Rating	<p>Integration and Interworking Very Strong</p> <p>Lifecycle Management Very Strong</p> <p>Production Experience Leader</p>	<p>Solution Components Very Strong</p> <p>Standards and Interface Support Leader</p>
Product Scores	Very Strong	
Strengths	<ul style="list-style-type: none"> Nokia Unified Inventory has been providing near real-time discovery and reconciliation longer than most competing products, resulting in a large library of connectors for legacy equipment. Nokia's NaaS is a promising front end into its orchestration capabilities. An early mover on hyperscaler partnerships, Nokia has strong experience in hybrid/partner orchestration. 	
Limitations	<ul style="list-style-type: none"> Other vendors are substantially improving their inventory and topology systems, narrowing Nokia's lead in this area. Similarly, Nokia's lead in hyperscaler orchestration is not as wide as it once was. Nokia has less of a service partner ecosystem than some of its competitors. 	
Product Name	Whale Cloud Digital OSS	
Current Perspective	<p>Because Chinese carriers are reluctant to have their equipment vendors handle service orchestration as well, they assign that task to IT specialists. Whale Cloud is one of the chief network service orchestration vendors in the Chinese market and has expanded its activity to EMEA, other Asian countries, and a few deployments in Latin America.</p> <p>While it has supplied its service orchestration product to mobile and integrated operators, Whale Cloud's largest experience lies in fixed-line/optical networks. When it applies its orchestration to mobile networks, it often does so in collaboration with the radio vendor. ZTE - which is one of the owners of Whale Cloud - is the most frequent partner in this scenario.</p> <p>Whale Cloud has a strong set of out-of-the box resource discovery and fulfilment use cases, especially related to optical networks. Thanks to its European clients, it also has more experience with Western hyperscale clouds than many Chinese vendors.</p>	
Buying Criteria Rating	<p>Integration and Interworking Strong</p> <p>Lifecycle Management Very Strong</p> <p>Production Experience Strong</p>	<p>Solution Components Strong</p> <p>Standards and Interface Support Strong</p>

Product Scores	Strong
Strengths	<ul style="list-style-type: none"> • Whale Cloud's work for Chinese carriers gives it experience orchestrating services at massive scale and also gives it experience managing production 5G standalone networks. • In addition to telecoms networks, Whale Cloud's solution also handles IoT and data center networks. • Whale Cloud also offers a prepackaged service/slice catalog for enterprise business units.
Limitations	<ul style="list-style-type: none"> • Whale Cloud's mobile network orchestration experience is more limited than with fixed networks, especially outside China. • Whale Cloud's experience integrating with third-party systems is more limited than the leading service orchestration vendors. • Whale Cloud's lifecycle management capabilities also lag category leaders.

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