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Market Engineering

Singapore Infrastructure as a Service (IaaS) Buyers' Guide, 2018

Global Digital Transformation Research Team at Frost & Sullivan

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Executive Summary

- Singapore leads the ASEAN region in terms of maturity of cloud infrastructure adoption among enterprises. The Singapore IaaS market is expected to grow at a CAGR of 31.3% from 2017 to 2024, with the overall market size reaching $1.67 billion in 2024 from $249.0 million in 2017.
- Expansion of hyperscale cloud providers is eventually driving investments in data center expansions by data center operators. With cloud vendors such as Google, Alibaba, and AWS expanding their cloud service businesses in Singapore, the resultant demand for necessary storage and managed hosting is also expected to be higher. Launch of the Google Cloud Platform Region in Singapore in June 2017, where the first Google cloud servers were launched, has made Singapore well-positioned to emerge as the leading cloud infrastructure hub within Southeast Asia.
- Hyperscale cloud vendors such as AWS, Google Cloud, and Alibaba Cloud are expected to push for the adoption of public cloud services by LBs, as well as SMBs. Factors such as high quality of service, affordable pricing, and scalability are expected to be key factors driving the adoption of public cloud services. The continuous roll-out of the Government Cloud (G-Cloud) initiative continues to fuel the demand for third-party outsourced IaaS.
- Market participants will continue to include more bundled managed services, together with their cloud infrastructure portfolios. Singtel's Cloud Lifecycle Services, including its managed cloud portfolio across hybrid cloud platforms, and Rackspace's acquisition of Datapipe's global business to enhance its managed services portfolio are some of the examples of cloud vendors increasingly pushing for the adoption of managed cloud services.

Source: Frost & Sullivan

Executive Summary (continued)

- Singapore's IaaS market comprises global service providers and local telecom service providers. . Key global cloud service providers include Rackspace, Centurylink and Fujitsu. Among the local cloud service providers, national telco. Singtel continues to emerge as the leading cloud service provider.
- Stiff competition and increasing commoditization of pure-play storage and cloud offerings is driving providers offer new services and innovate. These include bundling more managed services (such as managed security and analytics) into their cloud services portfolio, thereby shifting the focus away from being a pure reseller of public cloud services.

Source: Frost & Sullivan

Market Definitions

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Market Definitions

Cloud Computing refers to hosted services which involves a pool of computing, memory, and input/output (i/o) resources, applications or operating environments with seemingly infinite scalability, delivered over a network, be it private or public.

Characteristics

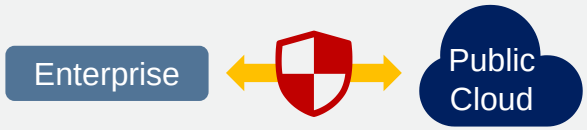
- **On-demand service, self-service**
- **Pay-as-you-use, metered consumption**
- **Rapid elasticity, scale-up/down of services**
- **Shared pools, illusion of infinite resources**
- **Broad network access using standard Internet Protocols (IPs)**

Service Types

- **Software-as-a-Service**
- **Platform-as-a-Service**
- **Infrastructure-as-a Service**

Deployment Models

Public



Private

Community

Hybrid

Source: Frost & Sullivan

Market Definitions (continued)

- IaaS refers to hosted, scalable data center infrastructure resources, available on-demand, without term or usage commitments, and charged via a pay-per-use model. IaaS comprises a ‘raw’ infrastructure, in which users can build and deploy applications or workloads.
- The two types of IaaS defined in this study include Computing-as-a-Service and Storage-as-a-Service..
- There are essentially three types of cloud service delivery models which are as follows:
  - ❖ Private Cloud
  - ❖ Public Cloud
  - ❖ Hybrid Cloud
- Cloud Management Platforms refers to a connected platform which allows the customers to directly carry out efficient governance, management and provisioning of cloud infrastructure solutions, thereby reducing vendor dependency.
- All currencies are denominated in US Dollars ($), unless otherwise stated.

Source: Frost & Sullivan

Market Overview

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IaaS – Creating Value for End Users

Total IaaS Market: Key Market Drivers, Singapore, 2018–2024

	1–2 years	3–4 years	5–7 years
Direct vendor connectivity to multiple cloud platforms	**H**	**H**	**H**
Lower operational expenses thanks to outsourced infrastructure management	**H**	**H**	**M**
Scalable nature of service provisioning	**H**	**M**	**M**

Impact ratings: H = High, M = Medium, L = Low

Source: Frost & Sullivan

Drivers Explained

Direct vendor connectivity to multiple cloud platforms

- The IaaS architecture is slowly moving towards a multi-cloud arrangement where in enterprises prefer multiple cloud vendors for different cloud offerings to avoid vendor lock-in, performance optimization as well as improved reliability.
- Cloud service providers in Singapore are increasingly ensuring direct hybrid connectivity to multiple hyperscale cloud platform to ably support their customer's multi-cloud environments.

Lower operational expenses thanks to outsourced infrastructure management

- Increasing number of SMBs have been taking up public cloud services for their cloud computing needs, thanks to cost benefits. Public cloud services allow SMBs to convert their capital expenditure (CAPEX) into operational expenditure (OPEX), owing to the pay-as-you-go model.
- The public cloud model frees up the resources required for managing the infrastructure, thereby allowing SMBs to focus more on their core competencies.

Scalable nature of service provisioning

- In an IaaS environment, the enterprises outsource their infrastructure requirement to the cloud infrastructure provider which allows them to easily scale up or scale down on their resources as per the requirement.
- Additionally, the vendor dependency goes down with the availability of cloud management platforms which provides the enteprises with an automated platform allowing direct easier resource as well as spend management.

Source: Frost & Sullivan

IaaS Evolution Over the Years, Singapore

Private/Public Cloud

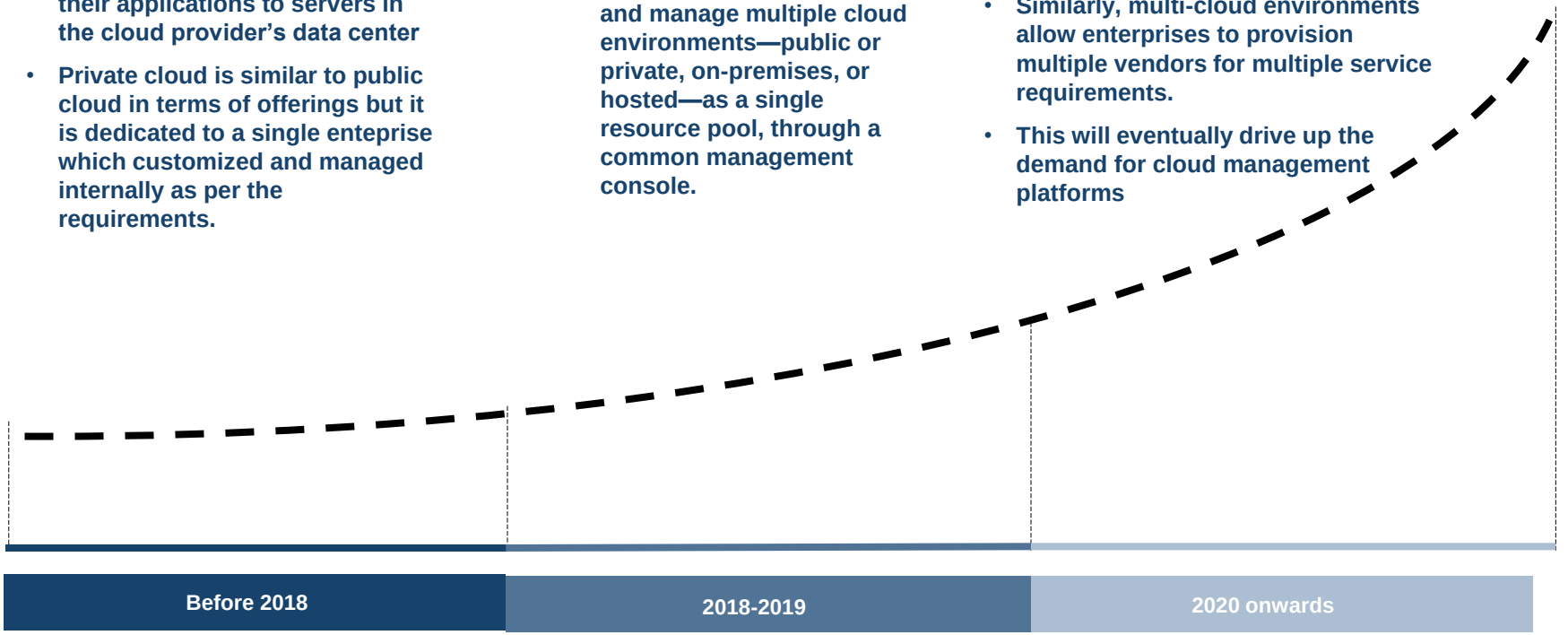
- Public cloud refers to a hosted environment, where the server and network infrastructure is shared among enterprise subscribers. Enterprises upload their applications to servers in the cloud provider's data center
- Private cloud is similar to public cloud in terms of offerings but it is dedicated to a single enteprise which customized and managed internally as per the requirements.

Hybrid Cloud

- Hybrid cloud comprises multiple IT environments (public and private).
- In a hybrid configuration, enterprises may configure and manage multiple cloud environments—public or private, on-premises, or hosted—as a single resource pool, through a common management console.

Multi-Cloud/Edge Computing

- Edge computing provides real-time data processing. The majority of data storage and compute will be done at the edge with a smaller computing power than the cloud
- Similarly, multi-cloud environments allow enterprises to provision multiple vendors for multiple service requirements.
- This will eventually drive up the demand for cloud management platforms



IaaS is set to be the dominant cloud solution in Singapore for the next 5-7 years

Key Success Factors – IaaS Management

Success Factor	Impact	Description
Connectivity		With most of the enterprises preferring multi-cloud environments to avoid vendor lock-in as well as better service delivery, it is imperative that the cloud service providers ensure direct connectivity to leading hybrid cloud platforms for the enterprises.
Platforms		With the increase in the adoption of complex edge as well as multi-cloud environments, the cloud management procedure continues to become complicated. Organizations are increasingly demanding cloud management platforms which can provide a snapshot of asset performances while allowing them to scale up or down instantaneously as per the requirement
Expertise		The cloud infrastructure providers will need to ensure that the personnel is at ease with the complex cloud technologies such as multi-cloud and edge computing. The cloud vendors will have to provide upskilling sessions for the work force to ensure they can handle complex cloud scenarios comfortably

Intensity:  **Very High**  **High**  **Medium**

Source: Frost & Sullivan

Company Profiling

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Company Profiling

The following section contains profiles of the leading vendors in the cloud infrastructure as a service market in Singapore. While Frost & Sullivan has tried to achieve parity in available profile detail, not all vendors were readily available or equally forthcoming.

Cloud Management Evaluation Criteria:

Hybrid Management Capabilities: Evaluates whether the platform has the ability to manage infrastructure from multiple cloud providers—whether the cloud being managed is private and resides on the customer's premises or in a hosted facility; or public and is hosted by the cloud provider. Also listed are the major providers that customers seek to manage.

Multiple Hypervisor Capabilities: Evaluates whether the platform can manage virtualized infrastructure (including premises-based private clouds) from the three major hypervisor platforms, including Microsoft HyperV, KVM, and VMware.

Self-Service Portal: Self-service portal is a web based dashboard which allows the customers to effectively monitor and manage several aspects of their network infrastructure including resource scaling and billing amongst others.

Source: Frost & Sullivan

Company Profiling (Continued)

DevOps: The platform's ability to support DevOps by providing the necessary runtime and coding support with sustained agility and flexibility.

API Automation and Orchestration: Easy integration of applications with native cloud management system for automation and orchestration enabled by readily available application programming interfaces.

Security Patching: the platform's ability to automatically roll out new security patches that fix vulnerabilities, or enhance overall security function, automatically.

Capacity Optimization: the platform's ability, based on policies set at the time of deployment, to ensure that IT resources are right-sized to meet business requirements in a cost-effective manner.

Auto-Scaling: the platform's ability to automatically add or remove compute resources, depending upon actual infrastructure usage. *Horizontal* auto-scaling allows users to start or stop a previously provisioned cloud server when a pre-defined usage threshold is reached. *Vertical* auto-scaling allows for the amount of CPU or RAM to be modified when pre-defined thresholds are exceeded.

Network Monitoring and Assurance: The platform's ability to observe the usage of the network infrastructure, and report on whether it is performing as anticipated.

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Source: Frost & Sullivan

Company Profiling (Continued)

Compliance and Governance: The platform's ability to allow the enterprises to design policies and various automated trigger actions to ensure compliance with the existing government regulations.

Spend Management: The platform's ability to provision a dashboard for the customers to give them a better understanding of the cloud based spending. This feature allows the customers to better manage and analyze their cloud spend, thereby helping the customers to ensure better budgeting and financial planning as well as billing related alerts.

Billing and Showback: This feature of the platform gives the customer a better insight into the prices and billing information of the solutions acquired by them.

Service Catalogue: The service catalogue which displays details and pricing of an organization's cloud infrastructure offerings, thereby allowing to customers to select solutions as per their requirements.

Source: Frost & Sullivan

Singtel

Singtel is one of the world's largest telecommunication companies. Based in Singapore, it provides a complementary array of workforce mobility solutions, data hosting, cloud network infrastructure, analytics and cyber-security capabilities.. Trustwave, a Singtel company, is also a global managed security services provider, with ten advanced security operations centers and an arsenal of 2,000 security-minded professionals. Singtel has built a comprehensive set of products and services to enable our customers' digital transformations. These products and services span private cloud, public cloud, tools and skills needed to transform at scale.

Key Highlights:

- Singtel introduced Liquid Platform - the next generation unified Multi-cloud orchestration, a single pane of glass to control a hybrid environment. It provides self-service to those requesting IT resources and orchestrating all of the tools required for enterprise agility, resulting in increased agility and minimised risk across multiple cloud environments. Everything is integrated 'out-of-the-box' for rapid time to value.
- Singtel and VMware set up DTF in Singapore last April in Singapore, designed as a "virtual sandbox" for customers to organise proof-of-concept experiments to catalyse their product entry into the market.
- The company also launched Singtel Cloud Shop – a cloud commerce ecosystem to make it easy for customers to procure and consume Cloud services

Source: Frost & Sullivan

Singtel (Continued)

Key Features	Quantitative/Qualitative Value
Core Value Proposition for Cloud Customers in Singapore	• End-to-end Cloud Offerings supported by full spectrum of telco solutions, including Cyber Security, Data Centres, Wide Area Networks, and Managed Services • Cloud Operating Model (COM) framework accelerates government and enterprises' hybrid cloud maturity • Managed Cloud Connectivity offers secure access to public cloud applications through Singtel Cloud Access Gateway
Key Innovations and Differentiation in Cloud Infrastructure Segment	• Liquid Platform enables next generation unified multi-cloud orchestration and DevOps • 5,000 Singapore-based business and IT experts specializing in hybrid cloud design, development and operation focusing on automation/ SLA-based delivery • Sole provider of Government Cloud Services for whole-of-government use and sees a year-on-year growth rate of 106% with more than 80 government agencies on-board
Current offerings in Cloud Infrastructure Segment	Cloud Lifecycle Services, Cloud Management Platform, Managed Private Cloud, Managed Public Cloud, Managed Virtual Private Cloud, Managed Cloud Security, Managed Cloud Connectivity, Cloud-enabled Data Centres
Multi-cloud Management Platforms	Liquid Platform
Technology Partners	AWS, MS Azure, VMware, Alibaba Cloud, Dell EMC, Nutanix

Source: Frost & Sullivan

NTT Communications

NTT Communications is a subsidiary of the Nippon Telegraph and Telecommunication Group based in Japan. It is one of the major end-to-end ICT service provider in the Asia Pacific region providing enterprise private, public as well as hybrid cloud services. Owing to its, established data center and network infrastructure in Singapore, NTT Communications has emerged as one of the leading cloud infrastructure providers in Singapore market.

Key Highlights:

- NTT Communications launched its Global Management One (GMOne) Partner Program, which is poised to be an important part of NTT Communication's sales strategy. Under this program, NTT Communications will provide industry knowledge, benefits and incentives for its ICT services to the business partners in return for selling and promoting NTT's managed services offerings to the enterprises.
- NTT Communications has also launched its software defined everything 'SDx+M' is focused towards delivering ICT services using software defined technologies, thereby enhancing its managed services portfolio.
- NTT Communications introduced the Cloud Management Platform (CMP) which provides a customizable dashboard to the customers providing them asset performance metrics for faster decision making and efficient management of available managed services. NTT Communications also launched NexConnect Cloud Service in Singapore in conjunction with Megaport

Source: Frost & Sullivan

NTT Communications (continued)

Key Features	Quantitative/Qualitative Value
Core Value Proposition for Cloud Customers in Singapore	• Unified management of all cloud and legacy IT systems via single interface • Highly customizable hybrid cloud solutions • Enterprise Cloud is based on industry-standard technology sourced from providers including VMware, Cisco, EMC, Microsoft and Red Hat
Key Innovations and Differentiation in Cloud Infrastructure Segment	• Software Defined Exchange Services • Remote Infrastructure Management Service • All data centers are connected to the NTT Communications global network and are integrated with software defined networking (SDN)
Current offerings in Cloud Infrastructure Segment	Managed Cloud, Multicloud, Cloud Orchestration, Managed Private Cloud, Managed Public Cloud, Managed Virtual Private Cloud, Cloud-enabled Data Centres
Multi-cloud Management Platforms	Multi-Cloud Connect
Technology Partners	MS Azure, AWS, VMware, ServiceNow

Source: Frost & Sullivan

Rackspace (continued)

Rackspace is one of the leading managed cloud services provider based out of United States of America. In Singapore, Rackspace provides supplier-neutral managed services which are able to help clients select cloud platforms agnostically as well as provides services across applications, data, security and infrastructure. Rackspace provides connectivity to leading cloud platforms in Singapore which includes AWS, Google Cloud Platform, MS Azure and Oracle Cloud amongst others.

Highlights:

- Rackspace acquired Datapipe which is a leading provider of private and public cloud solutions globally which provided it with the necessary data center infrastructure to expands its managed cloud portfolio.
- Rackspace has allowed customers to place their own hardware in Rackspace' data centers which enables direct connections with leading cloud vendors like AWS, MS Azure and Alibaba Cloud.
- Rackspace also recently announced the launch of managed services for Google Cloud Platform. VMware vRealize is supported if a customer subscribes to Rackspace Private Cloud powered by Vmware while Redhat CloudForms is supported if a customer subscribes to Rackspace's Managed OpenShift Platform

Source: Frost & Sullivan

Rackspace (continued)

Key Features	Quantitative/Qualitative Value
Core Value Proposition for Cloud Customers in Singapore	• Strategic location in Singapore; ability to connect with other Southeast Asian countries • Supplier-neutral managed service provider • Ability to deliver and manage all local major Hyperscale Public and Private Cloud available in the local markets.
Key Innovations and Differentiation in Cloud Infrastructure Segment	• Unified multi-cloud management • Custom Built Cloud Solutions (‘Service Blocks’) – Managed Public Cloud Services
Current offerings in Cloud Infrastructure Segment	Private cloud, public cloud, hybrid cloud, multi-cloud connectivity, server virtualization, cloud management services
Multi-cloud Management Platforms	Rackspace Unified Multi-cloud Management Platform - cross-platform cloud management that reduces the complexity of managing multiple public clouds
Technology Partners	MS Azure, VMware, SAP, Oracle

Source: Frost & Sullivan

CenturyLink

CenturyLink has a proven experience with operational excellence and expertise to ensure application and infrastructure resiliency. CenturyLink's broad portfolio of Cloud Infrastructure Services and Managed Services help enterprises in Singapore adopt and leverage a combination of Private, Public and Multi-Cloud solutions to become more agile and confidently meet market demands. Additionally, CenturyLink provides its customers with insights into workload performance, data security, and network usage amongst others.

Highlights:

- In October 2018, CenturyLink launched its first security operations center (SOC) in Singapore which is focused towards serving the entire Asia Pacific region.
- CenturyLink acquired Level 3 Communications which was an American company, owned by Singapore based ST Telemedia. The merger will provide CenturyLink with Level 3's strong network infrastructure as well as strong client base across APAC.
- IBM and CenturyLink extended their partnership under the IBM Cloud Direct Link Service Provider Program, which is focused towards enhancing CenturyLink's enterprise connectivity solutions.
- CenturyLink became an authorized premium supplier for SAP Hana Enterprise Cloud in the Asia Pacific region.

Source: Frost & Sullivan

CenturyLink (continued)

Key Features	Quantitative/Qualitative Value
Core Value Proposition for Cloud Customers in Singapore	• Proven experience with operational excellence and expertise to ensure application and infrastructure resiliency • Ultra-low latency colocation and proximity hosting, with one-way connectivity to the Singapore Exchange and rapid cross connects with Tokyo, Hong Kong, and UK financial markets • Total reliability support by 100% power uptime SLAs through Cyxtera data centers located in Singapore
Key Innovations and Differentiation in Cloud Infrastructure Segment	• CenturyLink Private Cloud combines VMware's vSphere®, vSAN™ and NSX® into a integrated stack, delivering enterprise grade, hyper-converged-infrastructure with CenturyLink's automation and management capabilities • CenturyLink Public Cloud features high-performance compute offerings providing performance for data and web scale architectures such as Hadoop, Cassandra, and Couchbase
Current offerings in Cloud Infrastructure Segment	Virtual Cloud, Private Cloud. Dedicated Cloud Compute, Managed SAP infrastructure, Managed Services, Cloud Connects, Network Security, Cloud Management Platforms
Multi-cloud Management Platforms	CenturyLink Cloud Application Manager
Technology Partners	MS Azure, SAP, Oracle, AWS, Dell EMC, Cloudera, Intel, HPE, IBM

Tata Communications

Tata Communications is a global provider of enterprise communications and hybrid cloud services, with presence in India, Asia Pacific, Europe and the US. In Singapore, Tata Communications is a leading cloud infrastructure service provider, thanks to its robust network connectivity and a wide array of innovative cloud offerings which includes private, public and hybrid cloud services as well as cloud enablement platforms

Highlights:

- Tata Communications achieved Multi-Tier Cloud Security (MTCS) Level 3 (highest level) of Singapore's Cloud Service Provider (CSP) certification in October 2017.
- Tata Communications has partnered with MS Azure to provide managed cloud services on the Azure cloud platform. Similarly, the company has partnered with AWS to provide a managed cloud services on the AWS platform
- To extend the reach to larger ecosystem, the company has also partnered with Oracle to provide its customers with direct access to Oracle Cloud platform
- Tata Communications has established cybersecurity response center in Singapore which provides integrated managed security solutions to the customers which will help the clients to prevent potential data breaches and other security threats.

Source: Frost & Sullivan

Tata Communications (continued)

Key Features	Quantitative/Qualitative Value
Core Value Proposition for Cloud Customers in Singapore	• Strong cloud enablement platform with experience and expertise in over 30 countries • Wide array of cloud based services • Direct connectivity to major cloud platforms
Key Innovations and Differentiation in Cloud Infrastructure Segment	IZO Cloud Analytics service allows enterprises to implement Big Data capabilities which can be integrated with BI and visualization tools, IZO Cloud Containers provides an agile infrastructure which accelerates application delivery on cloud and DevOps implementation
Current offerings in Cloud Infrastructure Segment	Private Cloud, Cloud Containers, Cloud Analytics, Managed Cloud Services, Private Connect, Public Connect
Multi-cloud Management Platforms	IZO (Cloud Enablement Platform)
Technology Partners	AWS,MS Azure, Alibaba Cloud, Oracle, Salesforce, IBM, Google Cloud

Source: Frost & Sullivan

Fujitsu

Fujitsu is a Japanese IT equipment and service provider currently headquartered in Tokyo, Japan. The company provisions hardware, software as well as network business solutions and is one of the leading IT services provider in the Asia Pacific region. In Singapore, Fujitsu has the necessary data center infrastructure to effectively support its cloud portfolio which is highly focused on providing cloud infrastructure solutions such private hosted cloud, public cloud, private cloud and IT cloud management.

Highlights:

- Fujitsu Enterprise Cloud Service K5 is the one of the world's biggest OpenStack cloud solution provisioning IaaS for virtual machines and bare metal services.
- Fujitsu is planning to collaborate with Nuage Networks which is the software defined networking arm of Nokia, to further expand and update its enterprise cloud coverage in the Asia Pacific region. Nuage will provide Fujitsu with the 'Virtualized Services Platform' which will ease the cloud integration process, thereby making the IaaS platform highly flexible and customizable.
- Fujitsu has partnered with Veritas to be the key storage service provider as a part of Fujitsu's Enterprise Cloud Service K5 IaaS solution to further boost its data security and management capabilities.

Source: Frost & Sullivan

Fujitsu (continued)

Key Features	Quantitative/Qualitative Value
Core Value Proposition for Cloud Customers in Singapore	• Enterprise Cloud Service K5 is one of the largest Openstack cloud IaaS vendor globally virtual machine and bare metal services • Easier management of hybrid IT while reducing operational costs • AWS Standard Public Sector Consulting Partner • Global standardized governance for Cloud Management
Key Innovations and Differentiation in Cloud Infrastructure Segment	• Unique IaaS connectivity solutions to SAP users via Fujitsu's SAP IaaS • Local Cloud Platform powered by VMWare Technology
Current offerings in Cloud Infrastructure Segment	• Fujitsu Cloud IaaS (Fujitsu Cloud Service K5, Private Hosted Cloud, Public Cloud, Private Cloud) • Fujitsu Cloud Professional Services (Feasibility Studies, Cloud Inception Program, Cloud Architecture Design, Implementation Services, Cloud Education, Cloud Expansion and Bridging Services) • Fujitsu SAP IaaS
Multi-cloud Management Platforms	• Fujitsu Software Enterprise Service Catalog Manager • Fujitsu Cloud Service PICCO - cloud cost management for AWS, Google Cloud , MS Azure, Openstack and FUJITSU K5
Technology Partners	• MS Azure, VMware, SAP, Oracle

Cloud Management Platform Comparison

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Cloud Management Platform Comparisons

Cloud Management Platforms: Hybrid Management Capabilities			
Provider	Singtel	NTT Communications	Rackspace
Multi-Cloud Management Capability			
AWS	●	●	●
Microsoft Azure	●	●	●
Google Cloud	●	●	●
IBM Softlayer	●	●	●
CloudStack	●	●	●
OpenStack	●	●	●

Intensity: ● **Provider offers** ● **Provider offers through partners** ● **Provider does not offer**

Source: Frost & Sullivan

Cloud Management Platform Comparisons (continued)

Cloud Management Platforms: Hybrid Management Capabilities			
Provider	CenturyLink	Tata Communications	Fujitsu
Multi-Cloud Management Capability			
AWS	●	●	●
Microsoft Azure	●	●	●
Google Cloud	●	●	●
IBM Softlayer	●	●	●
CloudStack	●	●	●
OpenStack	●	●	●

Intensity: ● **Provider offers** ● **Provider offers through partners** ● **Provider does not offer**

Source: Frost & Sullivan

Cloud Management Platform Comparisons (continued)

Cloud Management Platforms : Service Orchestration and Optimization			
Provider	Singtel	NTT Communications	Rackspace
Offers Lifecycle Support			
Self-Service Portal			
API Automation and Orchestration			
Billing and Showback			
DevOps			

Intensity: **Provider offers** **Provider offers through partners** **Provider does not offer**

Source: Frost & Sullivan

Cloud Management Platform Comparisons (continued)

Cloud Management Platforms: Service Orchestration and Optimization			
Provider	CenturyLink	Tata Communications	Fujitsu
Offers Lifecycle Support			
Self-Service Portal	●	●	●
API Automation and Orchestration	●	●	●
Billing and Showback	●	●	●
DevOps	●	●	●

Intensity: ● **Provider offers** ● **Provider offers through partners** ● **Provider does not offer**

Source: Frost & Sullivan

Cloud Management Platform Comparisons (continued)

Cloud Management Platforms: Service Orchestration and Optimization			
Provider	Singtel	NTT Communications	Rackspace
Offers Lifecycle Support			
Compliance and Governance Management	●	●	●
Spend Management	●	●	●
Network Monitoring and Assurance	●	●	●
Multiple Hypervisor Management	●	●	●

Intensity: ● **Provider offers** ● **Provider offers through partners** ● **Provider does not offer**

Source: Frost & Sullivan

Cloud Management Platform Comparisons (continued)

Cloud Management Platforms: Service Orchestration and Optimization			
Provider	CenturyLink	Tata Communications	Fujitsu
Offers Lifecycle Support			
Compliance and Governance Management	●	●	●
Spend Management	●	●	●
Network Monitoring and Assurance	●	●	●
Multiple Hypervisor Management	●	●	●

Intensity: ● **Provider offers** ● **Provider offers through partners** ● **Provider does not offer**

Source: Frost & Sullivan

Cloud Management Platform Comparisons (continued)

Cloud Management Platforms: Service Orchestration and Optimization			
Provider	Singtel	NTT Communications	Rackspace
Offers Lifecycle Support			
Capacity Optimization			
Resource Management			
Auto Scaling			
Security Patching			
Service Catalogue			

Intensity:  **Provider offers**  **Provider offers through partners**  **Provider does not offer**

Source: Frost & Sullivan

Cloud Management Platform Comparisons (continued)

Cloud Management Platforms: Service Orchestration and Optimization			
Provider	CenturyLink	Tata Communications	Fujitsu
Offers Lifecycle Support			
Capacity Optimization	●	●	●
Resource Management	●	●	●
Auto Scaling	●	●	●
Security Patching	●	●	●
Service Catalogue	●	●	●

Intensity: ● **Provider offers** ● **Provider offers through partners** ● **Provider does not offer**

Source: Frost & Sullivan

Last Word

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Last Word

- The Singapore cloud infrastructure market will gravitate toward a hybrid deployment model (partially premises-based and partially cloud-based) in the next 3–5 years. With the growing prevalence of disruptive technologies, more cloud vendors will be working toward deploying cloud-native ICT environments, supporting IoT, AI, and GPU offerings
- Enterprises are moving up the IT infrastructure stack and are demanding applications support, as well as integrated management solutions in multi-cloud environments (such as cloud orchestration, automation, and abstraction). Also, the enterprises are increasingly adopting a distributed IT infrastructure thanks to increased usage of edge functionalities. The demand for cloud management platforms is expected to be on the rise as the organizations continue to recognize this hybrid trend.
- Local cloud service providers in Singapore tend to focus more on their own cloud services and platform apart from the limited connectivity to AWS and Microsoft Azure, while the global cloud providers in Singapore continue to extend their services and management capabilities to include competitor's services. Similarly, cloud vendors across Singapore are enabling their management platform to ensure efficient multiple hypervisor management. The focus is more on reducing vendor dependency and allowing the customers to directly manage their cloud environments in terms of scalability and spend management.
- These providers which continue to extend their hybrid capabilities to support multi-cloud environments are bound to enjoy most of the demand from the enterprises.

Source: Frost & Sullivan