

SERVICE GUIDE

MANAGED PRIVATE CLOUD

SEPTEMBER 2019

aptum

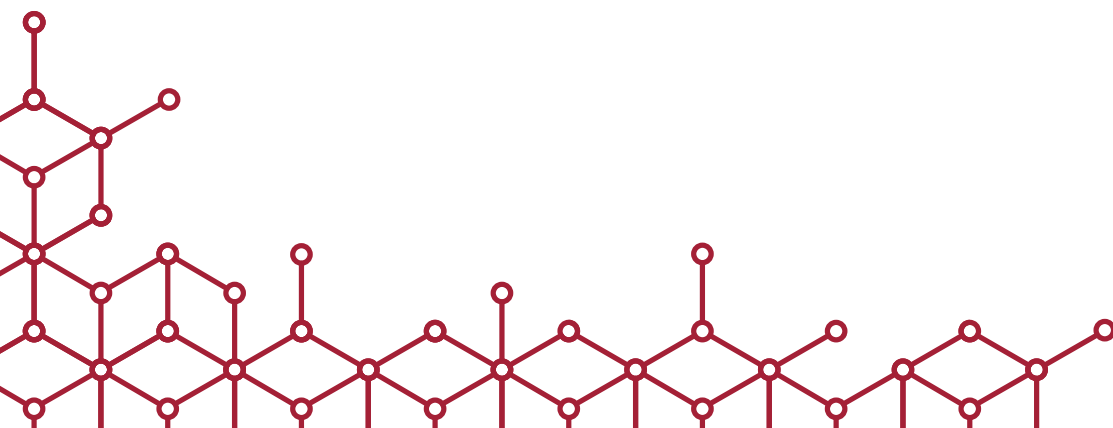


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1. INTRODUCTION TO MANAGED PRIVATE CLOUD

The overall promise of cloud computing is extremely compelling for businesses. It delivers unprecedented flexibility and scalability in a pay-only-for-what-you-use utility model, ensuring that you'll get exactly the infrastructure you need when you need it. There are also a huge number of choices.

We understand that as compelling as cloud computing can be, you need to make the right choice for your business. We get that despite the benefits of the cloud, there can be anxious moments when you start outsourcing critical operations. That's where a trusted partner like Aptum comes in. We can help your business by ensuring the use of proven platforms, leverage our experience, secure your architectures, and help you evaluate the costs. Additionally, our Managed Private Cloud solutions can help protect you from the "noisy neighbour syndrome" which can negatively impact your environment as well as your performance.

Cloud can be architecturally complex, time consuming to manage, and costly to hire and retain skilled resources. Aptum Managed Private Cloud solves these challenges by delivering a tailored solution that scales according to your infrastructure and staffing needs. From network, compute and storage to high-touch managed services – Aptum Managed Private Cloud enables you to rapidly respond to business demands, improve operational efficiency, enhance security and compliance, and better control your business's costs.

2. ABOUT MANAGED PRIVATE CLOUD

Managed Private Cloud from Aptum is the reliable, secure cornerstone of any cloud strategy, complementing public cloud solutions and working with them. A VMware-based solution, your Managed Private Cloud resides on a customized enterprise grade infrastructure dedicated solely to you. It delivers the right blend of proven infrastructure and advanced virtualization features, enabling you to leverage all the flexibility of cloud computing while avoiding the risks.

Aptum's Managed Private Cloud Solution assures that dedicated service components are fully monitored and provides notification of critical alerts as well as management and support of the infrastructure's incidents, configuration, maintenance, and access policies.

Our Managed Private Cloud delivers the peace of mind and reliability of the cloud, while meeting the demands of systems managed on premises.

3. CUSTOMER BENEFITS

Aptum's Managed Private Cloud Solutions provide dedicated computing resources including servers, storage area networks (SAN), and network switching infrastructure that are fully owned and managed by Aptum within a secure Data Center environment. These dedicated solutions are fully monitored and provide customers notification of critical alerts as well as management and support of the infrastructure's incidents, configuration, maintenance, and access policies.

Benefits include:

Freedom to focus on your core business – With a managed cloud solution, IT organizations **save time in sourcing, configuring, and managing infrastructure**, freeing up their teams to focus on growing the business.

Robust security and compliance – Our thoughtfully designed data centers **keep your solution operating optimally, while ensuring your data is physically secure**. Solutions provided can be specified with advanced security features such as Web Application Firewalls, Intrusion Detection Services, Log Managers, Distributed Denial of Service Protection Services, Firewalls, VPNs and SSLs.

Increase reliability and scalability – Leveraging features like vSphere Distributed Resource Scheduler, vSphere VMotion and VMware Storage VMotion, we can maximize hardware utilization, perform planned maintenance and dynamically allocate resources seamlessly and transparently for your users.

Protect mission critical data – The optional managed backup service ensures important organizational data is copied and held securely on a dedicated backup solution, with granular file restores available via the self-service interface.

Profile-driven storage – Our team of VMware and storage experts can create a variety of storage pools/disk configurations on the SAN with different price, performance and SLA targets, enabling you to match your virtualized workload to the right storage solution with ease.

Predictable and controllable costs (lower TCO) – Outsourcing can save your company time, labor, and money by freeing up and redirecting your internal staff and resources to support higher value, revenue-generating core business projects. In addition, outsourcing can alleviate the worry about software and hardware upgrades, network performance, maintenance and security. In addition, you are able to avoid CAPEX since you're not responsible for purchasing equipment.

vCenter access – vCenter provides a quick and easy solution for deploying and administering your virtual machines remotely. It also provides powerful features and capabilities to enable full control and management of your infrastructure.

Proven virtualization platform – VMware has become one of the most trusted, reliable and capable virtualization platforms that empowers most major businesses today. Their technology powers 100 percent of the Fortune 100 Companies and is positioned as a Leader in the Gartner's Magic Quadrant for x86 Server Virtualization for five years in a row.

Expertise on hand – Leverage Aptum's team of experts to help minimize the burden of infrastructure management – covering the key aspects involved in the hypervisor platform, the underlying infrastructure and the guest operating systems of virtual machines supplied by Aptum.

4. SERVICE OVERVIEW

Aptum provides 24/7/365 support through service centers located in the US and Europe. Our experienced team of administrators is well versed on managing VMware Private Cloud solutions tailored to your organization's requirements.

As a Managed Private Cloud customer, you can request assistance with the configuration and troubleshooting on the operating system of Aptum supplied virtual machines, and the underlying infrastructure of your VMware Managed Private Cloud solution.

An overview of the services available are:

- 24/7/365 support available by phone and the online ticket system at <https://support.aplum.com>. Email updates will be provided to keep you informed of progress.
- Incident Management ensures normal service is restored as soon as possible when there is an interruption to service. Our goal is to minimize any business impact that may result from the incident and ensure service level quality is maintained.
- Changes required to your environment will follow the standard service request process to ensure the requested changes are tracked and handled with minimal impact to the business.
- Access to the Aptum knowledge base.
- The basic monitoring package is included to ensure swift response and notification of service availability and hardware errors on the solution (as detailed in the monitoring section). More advanced monitoring packages are available if you require rich reporting dashboard and custom notifications.
- The patch management service will automatically deploy security and critical updates to the guest virtual server operating system (Microsoft Windows Server, CentOS, and Red Hat) on customer virtual servers – where the virtual server subscribed to the managed patching services. VMware hosts and vCenter minor version patching is handled on a per-request basis and will entail professional service for major version upgrades.
- The antivirus system will automatically deploy the latest heuristic definitions to subscribed customer virtual machines.
- Where the optional managed backup service is purchased and installed on a virtual machine deployed by Aptum, our engineers will monitor and remediate problematic backup jobs.

5. SERVICE PLAN

Aptum Managed Private Clouds are based on powerful infrastructure solutions backed by strong SLAs. This document details how Aptum provides monitoring and management services for the Managed Private Cloud solution.

The matrix below provides an overview of the Managed Private Cloud service plan:

MANAGEMENT TOOLS	MANAGED PRIVATE CLOUD
Best Practice Recommendations, Documentation and FAQ's	✓
Access to the Aptum Management Portal • Manage hosting infrastructure • View historical backup & bandwidth usage information • Review and approve your orders • Access to past and present invoices	✓
Access to the Online Ticket System & 24/7/365 Phone Support	✓
TECHNICAL SERVICES	MANAGED PRIVATE CLOUD
Best Practice Advisory Service • Provide opinions and best-practice advice on architecture, security and resilience	✓
Network and Security Configuration Assistance • Full backbone and access network infrastructure management • Configuration assistance for optional services purchased: • VPN Configuration (1-hour setup time included per VPN Service) • Firewall Policies • Load Balancer • Web Application Firewall • Threat and Log Management Services • DDoS Protection Service • Content Delivery Network	✓
Storage Management • Storage device deployment & configuration • Storage switch zone management • LUN presentation to servers	✓
VMware Hypervisor Management • Configuration assistance and troubleshooting services for the VMware hosts, storage, virtual networks & the vCenter server • Hypervisor versions supported will match those supported by VMware	✓

TECHNICAL SERVICES	MANAGED PRIVATE CLOUD
Virtual Machine Operating System Management • Managed deployment (or removal) of Aptum licensed virtual machines • Configuration assistance and troubleshooting services for support Aptum supplied operating systems and software* • Operating System versions supported mirrors those supported by the Operating System vendor developers (unless otherwise specified) • Managed Operating System security updates and patches for Aptum supplied operating systems and software • Antivirus installation and updates • Managed Backups (available as an optional service) • Pre-optimized, high performance Linux operating system build for Magento environments (available as an optional service)	✓
Monitoring • Service availability alerting • Network and Storage infrastructure health • Integration with Aptum incident management systems	✓
ACCOUNT MANAGEMENT	MANAGED PRIVATE CLOUD
Account Manager	✓
Customer Experience Management (CEM) Team	✓
Technical Account Manager (TAM)	Available as an additional service
SERVICE MANAGEMENT	MANAGED PRIVATE CLOUD
Service Request & Incident Management	✓
Vendor Escalation Management (for Aptum supplied services)	✓

*See Virtual Machine Management section of this service guide for further details.

OPTIONAL ADDITIONAL SERVICES	MANAGED PRIVATE CLOUD
Detailed Architectural Design & Deployment Services - Design Build Service - Discovery sessions run by an experienced solutions consultant and architect team - Full documentation is created, including a Statement of Work document and detailed solution diagrams - Delivery of a customized infrastructure solution fully architected and deployed based on business requirements	Available as an additional service
Migration Services - Services to help migrate your applications and data to the new environment - Delivered by Aptum or pre-approved specialist migration partners	Available as an additional service
Project Management Experienced project managers to coordinate large and complex deployment projects	Available as an additional service
DBA Packages & Professional Services - A team of certified DBA's who can help with performance and security optimizations of your business-critical databases - Available for MySQL, MariaDB and Microsoft SQL Server platforms	Available as an additional service

6. MANAGED PRIVATE CLOUD SUPPORT LEVEL DETAIL

6.1 Virtual Machine Configuration Assistance and Troubleshooting (IaaS VMs)

The virtual machine configuration assistance and troubleshooting element of the Managed Private Cloud simplify daily operating system management and minimizes the operational burden on the internal IT staff by helping with the following areas:

- Core operating system services
- Web servers (IIS, NginX & Apache)
- FTP/SFTP/FTPS Servers
- Email servers (SMTP, Sendmail, q-mail & postfix)
- Database servers (MySQL, MariaDB & Microsoft SQL Server)
- Control Panels (cPanel & Plesk)
- Backups (Tivoli or Veeam Backup)
- Monitoring

The virtual machine configuration assistance and troubleshooting service is only available with versions of Microsoft Windows, Red Hat and CentOS that are still officially supported by the operating system software vendors. No other versions or operating systems are eligible for this service.

VIRTUAL MACHINE OPERATING SYSTEM FEATURE	SUPPORTED	NOT SUPPORTED
Core Operating System Services		
DNS Server Role	✓	
Network Configuration and troubleshooting	✓	
Disk Management	✓	
Permissions, Local Users and Groups	✓	
Installation of server roles	✓	
Scheduled Tasks or Cron Jobs	✓	
Remote access (RDP & SSH) issues	✓	
Network shares	✓	
Performance issues relating to the operating system	✓	
Firewall configuration and troubleshooting	✓	
Configuration of operating system automatic patch installation scheduling	✓	
Installation of anti-malware agent	✓	
Disk and file encryption		✓
Web Servers (IIS, Apache & NGinX)		
Creation or configuration of websites and vhosts (directory, bindings, host headers, etc)	✓	
Website and URL redirects (excluding custom syntax)	✓	
Sale, installation and binding of SSL certificates	✓	
Web processor installation, configuration and troubleshooting (ASP/PHP)	✓	
Load balancer configuration and troubleshooting (health checks, loopbacks and website bindings)	✓	
Website permissions	✓	
Website performance, connectivity issues and errors relating to the web server, operating system and hardware	✓	
Website performance, connectivity issues and errors relating to application and code		✓
URL rewrites		✓
Remediation actions required for failed PCI scans relating to webserver security settings		✓

VIRTUAL MACHINE OPERATING SYSTEM FEATURE	SUPPORTED	NOT SUPPORTED
File Transfer Protocol Servers (FTP, SFTP & FTPS)		
Creation and configuration of FTP/SFTP/FTPS sites	✓	
Management of permissions	✓	
Installation and binding of SSL certificates	✓	
FTP user isolation		✓
FTP client troubleshooting		✓
Email Servers (IIS SMTP, MailEnable, Sendmail, Q-Mail and Postfix)		
SMTP Smart Host configuration	✓	
Mailbox setup and configuration	✓	
Domain configuration	✓	
Whitelist entries	✓	
Troubleshooting mail connectivity issues	✓	
Inbound SPAM issues	✓	
Outbound SPAM issues	Available optional professional service	
IP blacklist removal		✓
Upgrade/downgrade of mail server version if Plesk is installed		✓
Email client troubleshooting		✓

VIRTUAL MACHINE OPERATING SYSTEM FEATURE	SUPPORTED	NOT SUPPORTED
Database Servers (MS SQL, MySQL, MariaDB and Percona DB)		
Installation of an Aptum licensed database engine & components (e.g. SSRS, SSIS, SSAS)	✓	
Database user configuration	✓	
Database connectivity issues and errors relating to the database engine service availability, operating system & hardware	✓	
Configuration of automated SQL tasks or cron jobs	Available with optional professional service or a DBA Plan	
Database issues and errors relating to database queries or code		
Database alerting configuration		
Database clustering & replication		
Database tuning and optimization		
Installation of customer supplied database engine		
Database version upgrades and migration services		
Control Panels (Plesk and cPanel)		
Best practice advice and access to control panel specific knowledge base articles	✓	
Configuration assistance and troubleshooting of control panel functionality and features	✓	
Enablement of control panel features	✓	
Major release upgrades for Aptum supplied control panels when new versions are purchased	Available optional professional service	
Manual control panel installation		✓
Installation of third-party add-ons not supplied with the control panel		✓
Modifications of controlled elements outside of the control panel (i.e. directly through the operating system)		✓

VIRTUAL MACHINE OPERATING SYSTEM FEATURE	SUPPORTED	NOT SUPPORTED
Virtual Machine Backups		
Configuration and management of backup server	✓	
Installation of backup software (as appropriate)	✓	
Configuration of backup scheduling policy	✓	
Configuration of backup file exclusion filters	✓	
Monitoring of backup jobs and investigation of failures	✓	
Assistance restoring protected data	✓	
Backup data integrity testing		✓
Monitoring		
Creation of customer virtual machine health monitoring alert rules	✓	
Respond to and troubleshoot monitoring alerts related to virtual machine health	✓	
Third Party Applications & Vendor Escalation Management		
Vendor escalation management for any software or hardware elements supplied by Aptum	✓	
Support for any applications not provided by Aptum		✓

6.2 Supported Software Versions

Please note Aptum support extends to versions of software supplied by Aptum (preinstalled on the server, or available in our software repositories), and where they are current versions that the original software vendor still provides active support for. The configuration assistance and troubleshooting services are available for software licenses that have been provided by Aptum.

6.3 Realms of Support

If you require assistance with an item that extends beyond the typical scope for configuration assistance and troubleshooting (for example a third party application, or bulk administration tasks that go beyond reasonable use), our staff of experienced support may offer assistance as a professional service on an ad hoc basis.

6.4 Fair Usage Statement

Reasonable use for systems administration is defined as administration tasks that require a dedicated system administrator less than 30 minutes to complete. Any tasks exceeding this usage of a repetitive nature will be considered a bulk administration activity and may be scoped / quoted as a professional services engagement which the customer has an option to take up.

6.5 Antivirus Service

You may choose to opt services into the Aptum Managed Antivirus service. The service includes installation of the antivirus agent with a predefined exclusion configuration and updates the antivirus definitions as they are made available.

6.6 Operating System Managed Patching

Effective patch management of your cloud infrastructure services is crucial to ensuring your environment is protected from the most recent vulnerabilities and system instabilities that can cause downtime and loss of service.

Aptum can configure your virtual servers on a Private Cloud with either of the following patching configurations:

Automatic Scheduled Patching – With this selection you can select to have operating system security patches and updates installed on an automatic basis during a regular time slot to suit your business needs. This option is only available with Aptum supplied Operating Systems.

Manual Patching – This method disables the automatic scheduled updates on the server should you wish to manually control the operating system patch installation schedule by manually installing the updates yourself. Aptum will not automatically apply updates to database engines, clustered environments, or update middleware and other applications due to the risk to your environment.

Please note – Aptum offers manual patching as a professional service if you would prefer our support team to manually install the security updates and patches on your behalf.

6.7 Customer Supplied Software

Licenses and management services detailed in this document can only be provided for virtual machines that have been deployed by Aptum using our specialized operating system builds. Available operating system licenses and builds are based on the current generations of Microsoft Windows, Red Hat and CentOS operating systems.

Microsoft Windows Server is not eligible for License Mobility, this means you will not be able to supply your own Windows Server licenses on the environment (even if Software Assurance has been purchased). Otherwise, it is generally possible for you to supply your own operating systems or application licenses, into the VMware environment by deploying a new customer managed virtual machine.

Your licensed operating systems and applications will not be supported by Aptum. You are responsible for ensuring valid licenses are in place, along with ensuring that the terms of the supplied license are conformed too.

Please review term 9.3 of the Aptum MSA for further information.

6.8 Hypervisor Solution Managed Infrastructure Elements

The Hypervisor Management covers the following aspects that relate to the VMware solution and underlying infrastructure:

- Deployment and removal of Virtual Machines
- VMware licensing and configuration assistance
- Storage infrastructure management
- Network infrastructure management
- Monitoring

PRIVATE CLOUD INFRASTRUCTURE FEATURE	SUPPORTED	NOT SUPPORTED
VMware Hypervisor		
VMware host deployment and licensing	✓	
Configuration of high availability, DRS and resource pools	✓	
vCenter security configuration	✓	
vCenter network configuration (virtual switches, interfaces & VLANs)	✓	
vCenter storage configuration	✓	
vCenter User management and roles	✓	
VMware Hosts and vCenter minor versions and security update installation (on customer request)	✓	
Creation Virtual Machines (following an approved sales order)	✓	
Deletion of Virtual Machines (following a cancellation order)	✓	
VMware Incident management and troubleshooting	✓	
VMware vendor escalation management	✓	
VMware Hosts and vCenter major version upgrades	Available optional professional service	
Migration of virtual machines to a new VMware solution		
Creation and cloning of virtual machines (following an approved sale order)		
Configuration assistance and troubleshooting for virtual machines using customer supplied operating systems		✓
Network Infrastructure		
Backbone network management and peering	✓	
Data center access switch management	✓	
IP address allocation and routing	✓	
VLAN configuration	✓	
Load balancer configuration (including health checks, loopback and website bindings on virtual machines) <i>Available with the optional purchase of Load Balancing Services</i>	✓	
Backbone and switch infrastructure monitoring	✓	
Network incident management and troubleshooting	✓	

PRIVATE CLOUD INFRASTRUCTURE FEATURE	SUPPORTED	NOT SUPPORTED
Security Services (Optional Services)		
Hardware firewall configuration and troubleshooting	✓	
Web Application Firewall (WAF) configuration and troubleshooting	✓	
Intrusion Detection System configuration and troubleshooting	✓	
Distributed Denial of Service (DDoS) protection system configuration and troubleshooting	✓	
Installation and sale of SSL Certificates	✓	
Configuration of periodic vulnerability scans to be run against solution	✓	
Remediation actions required for failed scans relating to solution security settings	Available optional professional service	
Storage Infrastructure		
Storage device deployment and configuration	✓	
Storage switch zone management	✓	
Presentation of LUNs to servers	✓	
Storage incident management and troubleshooting	✓	
Storage monitoring	✓	
Monitoring		
Creation of VMware infrastructure health monitoring alert rules	✓	
Respond to and troubleshoot monitoring alerts related to VMware infrastructure solution	✓	

6.9 VMware vCenter Access Levels

Aptum provides a customer user account to access vSphere, this “user” allows you to perform key activities for the VMware solution and virtual machines running on it.

The table below documents the permissions for features and actions that the customer user is able to perform, along with how this differs for virtual machines licensed by Aptum, and those licensed by the customer:

VMWARE ACTIVITY	APTUM LICENSED VIRTUAL MACHINES	CUSTOMER LICENSED VIRTUAL MACHINES
Virtual machine power control (power on/off, reset, suspend)	✓	✓
Virtual machine console access	✓	✓
Virtual machine basic resource configuration (CPU, memory, add new hard disk)	✓	✓
Virtual machine extended resource configuration: • Configure media (CD, Floppy disk) • Configure fault tolerance • Record/replay session • Remove/Extend hard disk	No access	✓
Installation of VMware tools	✓	✓
Snapshot control (create, rename, delete)	✓	✓
Resource pool management (create, rename, delete, assign VM)	✓	✓
Scheduled tasks (create, modify, remove, run)	✓	✓
Manage patches and upgrades – View compliance status	✓	✓
Manage patches and upgrades – extended • Remediate, scan & stage patches • Configure update manager • Manage and assign baseline	No access	✓
Aptum managed elements • Alarms • Data center • Datastore • Distributed virtual port group • Distributed virtual switch	No access	No access
Datastore	No access	No access

6.10 Solution Monitoring and Response

Aptum includes the Basic Monitoring package by default as part of your Managed Private Cloud Service. Basic monitoring will perform a series of checks against your virtual machines and VMware infrastructure that are most critical to protect against application downtime. In the case of an event, Aptum will notify you and perform a predetermined action on your behalf, according to our standard runbook actions.

The default alerting options configured for Basic Monitoring are as follows:

ALERT METRIC	THRESHOLD	DESCRIPTION
System Check	ICMP Host Check - No response	Alert if hypervisor host or the virtual server stops responding to ICMP traffic.
Service Check	Port Check HTTP / HTTPS - No response	Alert the hypervisor host or the virtual server stops responding to HTTP / HTTPS traffic.
Service Check	Port Check RDP / SSH - No response	Alert the virtual server stops responding to RDP / SSH traffic.
Hardware Check	Hypervisor Solution Hardware - No response	Alert if vCenter reports a hardware fault on the solution.

Should you like to have access to more detailed reporting, along with customization of thresholds and alerts, the Standard Monitoring package is available for an additional fee. The Standard Monitoring package is a powerful self-service monitoring and reporting platform that provides a unified solution to monitor all your managed servers, devices and applications with a single pane of glass for all your graphs, reports and alerts on your hybrid cloud and server infrastructure.

6.11 Solution Upgrades, Redesigns and Custom Services

Major solution upgrades and redesigns, and non-standard services approved through Aptum's Custom Service Request process, may be subject to separate scoping activities as part of a Professional Services engagement.

7. SOLUTION SPECIFIC AND OPTIONAL SERVICES

7.1 High Availability Private Cloud Solutions

It is recommended that Private Cloud solutions running business critical workloads be deployed in high availability manner to minimize the risk of downtime caused by any one element in the solution failing.

A high availability solution will typically leverage redundant infrastructure throughout the solution to ensure service is maintained should any one element fail. Common configurations we can deploy and manage are as follows:

- Multiple hypervisor servers in a clustered configuration – specified with dual power supplies, network and HBA connections
- Highly resilient SAN storage for the datastore to house Virtual Machines and data
- Redundant and diverse paths on the network switches and storage fabric
- Dual Load Balancers to distribute traffic between servers

The Aptum Solutions Architecture Team will be happy to help design a High Availability Private Cloud solution that meets your business requirements.

7.2 Backup and Disaster Recovery

It is recommended that a suitable backup and disaster recovery plan be considered and implemented. This protects your business by ensuring that you are able to recover quickly should the worst-case scenario occur. Aptum offers a Managed Backup service to ensure your critical data is protected in our dedicated backup environment.

The Tivoli and Veeam Managed Backup services include a monitoring element to detect and report failed backup jobs, these are flagged for investigation and resolved to ensure your data remains protected. Aptum is not liable for data integrity of backups, it is recommended that you regularly test restoration of data and virtual machines as part of a regular business continuity test plan.

Tivoli Backups

The Tivoli backup suite takes an initial full backup followed by incremental backups, this approach is most cost effective as it minimizes the amount of backup storage consumed and provides effective protection for critical data.

By default, all data on a virtual server is backed up to ensure maximum protection. However file exclusions can be set by contacting Aptum support. It is recommended that you do not set exclusions for servers being protected by the bare metal recovery service to ensure server integrity on restore.

Tivoli TDP for Microsoft SQL server is an optional license that can be applied to perform live backups of your Microsoft SQL database servers on a regular basis. This backup type will truncate the transaction logs.

Compatible Virtual Server Operating systems – Windows, Red Hat and CentOS.

A choice of schedules and retention policies are available, the most commonly requested are as follows:

○ **Weekly schedule**

- A weekly backup performed at a time to suite
- Active files retained as long as the service is subscribed
- One inactive (changed) file copy being retained for 30 days
- Deleted files retained for 30 days.

○ **Daily schedule**

- A daily backup performed at a time to suite
- Active files retained as long as the service is subscribed
- Six inactive (changed) file copies being retained for 30 days
- Deleted files retained for 30 days

Options for remote backups (backup data stored in a remote data center) and offsite backups (backup data stored in local data center and replicated to a secondary data center) are available if you require this service.

For further information on the Tivoli Managed Backup services, including limitations, please refer to the Tivoli Managed Backups technical description.

Veeam Backups

The Veeam backup suite is designed to protect virtual machines running in VMware environments, it takes a full backup of the virtual machine, followed by incremental backups - this provides effective protection in a cost-effective manner.

A choice of schedules are available, the most common are detailed below:

○ **Daily Incremental schedule (yearly retention)**

- A monthly full backup, with daily incremental backups
- 30 daily restore points
- 12 copies of the full monthly backup retained
- Deprovisioned virtual machine backups retained for 30 days

○ **Daily Incremental schedule (monthly retention)**

- A monthly full backup, with daily incremental backups
- 30 daily restore points
- Deprovisioned virtual machine backups retained for 30 days

○ **Daily Incremental schedule (7 day retention)**

- A weekly full backup, with daily incremental backups
- 7 daily restore points
- Deprovisioned virtual machine backups retained for 30 days

○ **Weekly schedule (monthly retention)**

- A monthly full backup, with weekly incremental backups
- 4 weekly restore points
- Deprovisioned virtual machine backups retained for 30 days

Options for offsite backups (backup data stored in local data center and replicated to a secondary data center) are available if you require this service.

For further information on the Veeam Managed Backup services, including limitations, please refer to the Veeam Managed Backups technical description.

7.3 Database Management

Aptum is able to provide management services for database servers. The standard service includes installation of the database engine, validation that the database engine is running correctly, and a monitoring service validates the database server is responding to requests on the relevant port.

The Database Servers that are available with managed services are as follows:

- Maria DB, Percona and MySQL Server - Versions vary depending on the Red Hat or CentOS version deployed, specific versions are available on request once server has been provisioned
- Microsoft SQL Server - 2012-2016, Standard and Enterprise versions

Database administration plans are also available as an option which provides a comprehensive database management service. Please see details under the optional services section of this service guide.

7.4 Network Management

High performance business and web applications demand fully scalable and resilient network solutions with guaranteed performance. Aptum provides full network management from the devices within your solution right up to the FastFiber™ Network that connects our 14 data centers together with the 50+ points of presence and network peering partners.

Backbone & Data Center Networks

The highly resilient FastFiber™ Network that makes up our backbone and the data center networks are actively managed and monitored by our 24/7/365 Network Operation Centers. Our team of experienced network engineers monitors the network around the clock, adjust peering relationships and reroute traffic as needed to ensure the network runs at optimal performance and health.

Customer Access Switches

Aptum takes full responsibility for the management of network access switches used within your solution. This includes full hardware support, configuration management and troubleshooting of any incidents related to the network layer.

Load Balancers / Global Load Balancing

Load balancers are devices that provide the ability to distribute network traffic between multiple servers to maximize throughput, minimizing response times, avoid overloading any single server and providing an additional layer of resilience into the solution.

Aptum offers Brocade ADX Load balancers which are configured in one of the following logical configurations:

Direct Server Return (DSR) path – In this frequently used configuration, the load balancer distributes requests to the servers in the load balanced web environment and the servers respond directly to the browser request. This is possible because the server has a loopback adaptor configured with the Virtual IP (VIP) that is being load balanced.

Inline – This configuration is frequently used for scenarios where SSL offload capabilities are required (the SSL certificate is installed on the Load Balancer itself). The main advantage of this configuration is the increased SSL performance in the solution as the load balancer handles SSL requests, in doing so reduces the load on the web servers and decreases the response time. A secondary benefit for large environments is the SSL only needs to be managed and installed on the load balancer rather than on many web servers. Either of the above topologies can be set up with load balancers in High Availability (HA) pairs. In HA mode the load balancers are configured in an Active/Passive manner.

Load balancers can be configured to distribute traffic using a variety of different algorithms, the most common is “least session” where a count of sessions distributed to each server is held on the load balancer and traffic is sent to the server with the least number of sessions – this helps maintain an even distribution of traffic between servers as users come and go.

There are scenarios where it is important to ensure the user’s session is consistently maintained by the same web server. Load balancers can manage this requirement by enabling the “sticky session” option for a protocol on each Virtual IP. This ensures session consistency is maintained.

Content Delivery Network (CDN)

A CDN service is a network of geographically distributed servers which collectively work together to accelerate content delivery across the internet. A CDN caches a copy of the web application assets (e.g. HTML pages, CSS files, images & video files) across the network and services your users from the CDN server geographically closest to the user. The result is faster page load times and reduced burden on your origin server solution.

Aptum offers a high performance origin caching CDN service that can be configured for a particular domain. Our support team will assist with the configuration of your CDN services as required.

7.5 Storage Management

Web applications demand innovative, scalable storage infrastructure. Aptum offers managed, configurable, shared and dedicated storage options, as well as direct attached storage servers and network attached storage servers.

The Solutions Architecture Team will design a solution based on your business requirements using a variety of options, resulting in high availability and performance that is tailored to your business needs.

The list of supported storage options is:

Internal Storage on Servers – Internal SATA, SAS and SSD disks with RAID controller in various configurations

Direct Attached Storage (DAS) – Dell MD Series

Storage Area Network (SAN) – NetApp and EMC Shared and Dedicated options with fiber channel switching Disk and RAID configurations for all options are customized to your required specifications based on desired performance, capacity and high availability outcomes

For DAS and SAN solutions redundant controllers and paths are available as an option for high availability solutions.

In a shared SAN environment each customer solution is isolated on the fiber switches using zone configurations that contain the World Wide Names (WWNs) for the server Host Bus Adaptor (HBA) and the WWN of the relevant SAN storage array. This ensures that each customer solution can only access the correct storage array and on the SAN itself a storage group is configured to restrict access to the relevant LUN (logical disk) for the customer solution.

Aptum will monitor and proactively investigate critical alerts that relate to the availability, health and performance of the DAS or SAN environment including immediate or potential failures. You would be notified of critical alerts via a ticket.

7.6 Security Management

No business executive wants to suffer the data loss, damaged reputation and business interruption which security breaches and outages can cause. Aptum can help secure your applications and infrastructure inline, on and around your network consolidating all of your managed IT services with our highly trained team of security specialists.

Securing your solution should take a layered approach and key layers of security are discussed in the following sections.

Firewalls & Virtual Private Networks

Firewalls are an essential perimeter defense device, a firewall sits in front of your infrastructure solution, inspecting traffic and only allowing traffic that meets the criteria of defined policies to pass through.

Aptum provides firewalls from the Juniper SRX series and the model will be specified according to your unique traffic and security requirements. The firewalls provided can be configured in various modes of operation, including transparent, routed or NAT configurations. Our Solutions Architects will advise on the best mode of operation for your needs.

In a managed environment the firewall will be provisioned with a default policy set that allows Aptum support teams to access your Managed Private Cloud environment. However all other traffic will be restricted initially. You can create a service request detailing any firewall policies or configuration required. These will be reviewed and implemented by our engineers on your behalf.

All firewalls provided have the option to enable VPN services. Licenses for such services can be purchased from Aptum on request. For each VPN service ordered, Aptum will provide 1 hour of professional services time to set up the VPN. Any additional hours needed (for more complex deployments) will be charged at our standard Professional Services rates.

SSL Certificates

SSL Certificates are small digital files that are used to encrypt traffic sent to and from a specific domain name using a cryptographic key. The process of issuing an SSL certificate validates organization identity and this helps to create trust for any end users who need to send information privately (e.g. authentication information, confidential information or credit card details).

Aptum is able to provide certificates that are issued by several well-known and trusted providers (Certificate Authorities) including GeoTrust, Digi-sign & Comodo.

Certificates purchased from Aptum will be installed free of charge on the web servers or load balancers in your solution.

Web Application Firewalls (WAF)

Web applications are an important part of your business and a vital channel for customer interaction. Unfortunately, web applications can also provide attackers access to your data and websites. This presents a serious business risk that needs to be mitigated.

Web Application Firewalls (WAF) are different from ordinary firewalls because they inspect traffic in the context of how the web application works, deflecting or alerting on any suspicious activities detected.

WAFs can be complicated to set up and manage, requiring a deep understanding of how web applications work, the application stack on which it sits, security risks and, of course, how to help the WAF learn about the environment it is in so that it can be configured and tuned optimally. Aptum will work with your teams to write the policies and configure the WAF for your environment.

WAFs can be set up in two configurations, either “inline” or “out-of-band”. Both offer many comparable features, however, with the inline deployment the WAF is able to intervene and quickly block detected attacks.

Threat Management (aka Intrusion Detection Service – IDS)

The Threat Management service devices sit inside the infrastructure solution. Its role is to monitor traffic traversing the network for threats. It can do this with signatures that identify patterns of malicious content within packets coming into or leaving the network.

The Threat Management service includes a notification service that will inform you of any successful, or imminent exploits detected - the mechanism used as an alert for such events is a ticket notification. All other alerts are configured to send you an email alert directly, enabling you to review the alerts and determine if any further action should be taken.

Log Management (aka Security Information & Event Management – SIEM)

Log Management is another layer of security. Its role is to act as an aggregation point for all logs in the solution so that they can detect and alert on potential security breaches. For example, a previous employee logging into a solution with old credentials.

The Log Management service includes a portal where all collected logs can be reviewed and searched. Within the portal, email notifications can be configured to alert you of any events of interest.

Distributed Denial of Service (DDoS) Protection

DDoS attacks are a common internet threat. They are essentially a flood of traffic sent to an internet facing system (often websites, but not exclusively), sourcing from many remote and distributed systems. The objective of a DDoS attack is to overload the targeted system so that its users are unable to access the service it provides.

Aptum offers a Managed DDoS protection service which automatically filters traffic sent to your solution to ensure DDoS attacks are blocked and only the legitimate “clean” traffic reaches the solution, ensuring the service remains active to end users.

Vulnerability Scanning

The Vulnerability Scanning service is available for customers who require this service to achieve a certification (e.g. PCI which requires at least quarterly scans from a PCI Security Council Approved Scanning Vendor), or who simply wish to satisfy themselves that a scanned solution is not vulnerable to known security vulnerabilities.

8. PLATFORM DELIVERY AND ONBOARDING

With the Managed Private Cloud solution, Aptum support teams are available to help with queries relating to how to configure in-scope elements of the VMware solution.

Our Solutions Architecture Team can provide expert advice and best practice recommendations on the ideal solution for your needs. The Managed Private Cloud service includes solution deployment as standard for all Aptum provided software and hardware elements.

For customers requiring an in-depth design and project managed deployment, Aptum offers an optional Design Build Professional Service. All Design Build service engagements include detailed architectural design diagrams and a Statement of Work covering all aspects of the solution to be deployed. Further information on this service is available in the Design Build service description.

9. SERVICE REQUESTS AND INCIDENT MANAGEMENT PROCESSES

The two primary ticket types for new support tickets are Incidents and Service Requests.

An Incident ticket is created to manage the restoration of service. Examples of incidents might include, but are not limited to:

- Server down
- Degraded performance
- Website inaccessible

Incidents are prioritized based on the impact and the urgency of the issue.

A Service Request ticket is created to track and manage changes that are required. Examples of service requests include, but are not limited to:

- New orders / provisioning
- User administrator
- Firewall rule changes
- Patching / software updates
- Reboot requests

Service requests will be assigned a lower priority than incident tickets.

9.1 Incident Management

Aptum will endeavor to provide a rapid response to any reported incident that may be impacting your Managed Private Cloud Solution. An incident is classified as an event where the restoration of service is the primary objective.

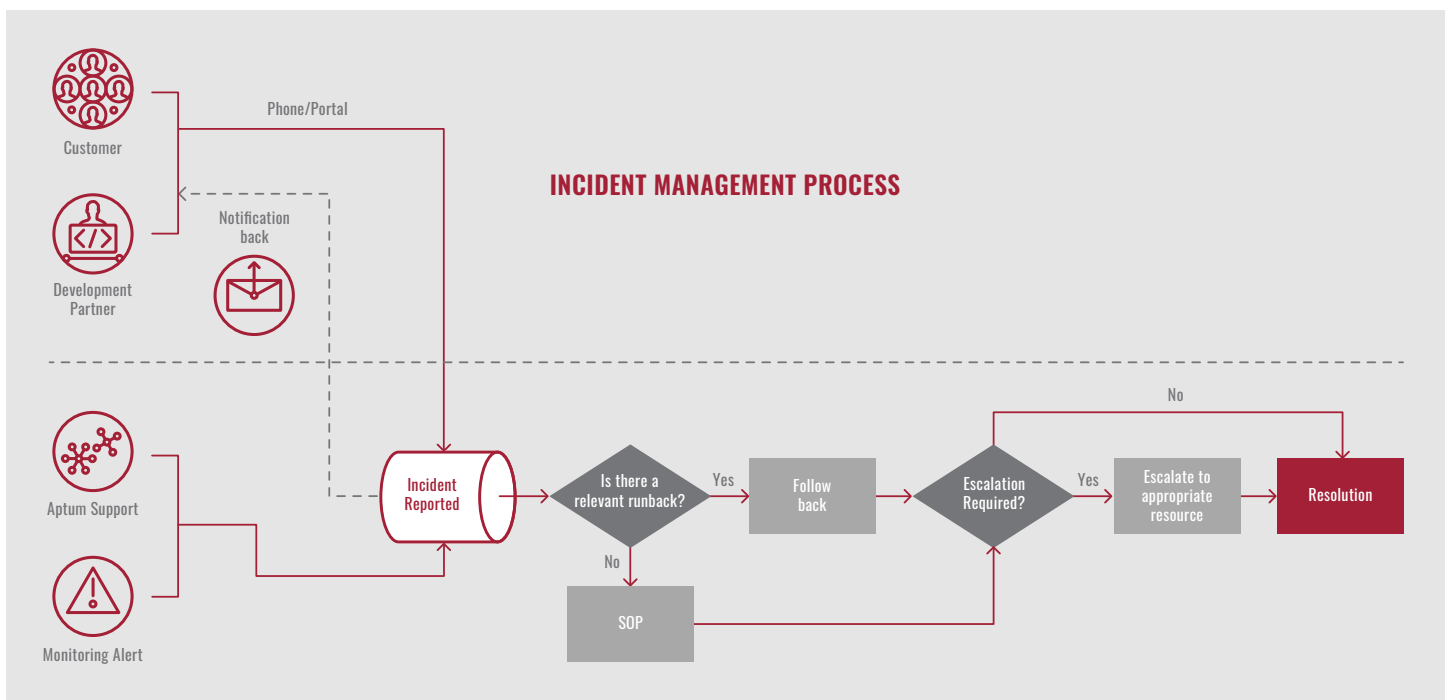
Aptum will work with you and your development partner (as appropriate) to restore service as quickly as possible when an incident occurs. Ensuring effective communication during the lifecycle of all incidents is our number one priority.

You can engage our experts to assist with incidents relating to the Managed Private Cloud Solution by creating a ticket in the Aptum online ticketing system or by calling the advertised support phone numbers. Aptum will create tickets for events generated by the monitoring system which will require your attention or the attention of the Aptum support team. All updates on incidents will be communicated to you via email from the Aptum ticketing system.

Aptum will triage the incident according to the impact and urgency of the event and assign a ticket priority. Should you desire an escalation of priority, please contact your Aptum support team who will consult with you on the priority level.

Aptum will collaborate with you and your development partner until the incident is resolved, at which point the ticket enters a two-week cooling period before closure. During this process, the Aptum support team will communicate regularly with you throughout the incident, detailing their finding and actions taken.

The diagram below describes the incident management process:



Incident Management Process Overview:

1. For new incidents, the first action is to triage the criticality and urgency of the incident, so the appropriate priority level can be assigned.
2. Incidents are handled by the support team and will be escalated to senior system administrators where it is determined that specialized skill sets are required.
3. Throughout the process, the support team will work with you as needed and will provide updates through to the point of resolution.
4. When incidents are resolved they will remain in this status for 14 days to allow customers to test or reopen if the fault reoccurs, where it reoccurs after this period it is logged as a new incident.

9.2 Service Requests and Changes

The Service Request Process utilizes our standard ticketing processes to deliver efficient and prompt handling of changes to your environment and uses the ticket system to ensure information relating to the activity performed is recorded.

For any requests that may impact your monthly billing, your Aptum Account Manager will be able to help advise you and your development partner on how to create the most optimized and cost efficient solution. Examples of changes that might impact the monthly price include increased traffic to your site that may require additional RAM, CPU or storage to be added to the solution. Optional design and deployment services are available on request.

Service requests will typically have a longer lead time before being executed than an incident which carries a higher priority due to the service impacting nature of an incident. Please ensure you plan sufficient lead time when submitting a service request to be processed, particularly if they are time-sensitive in nature.

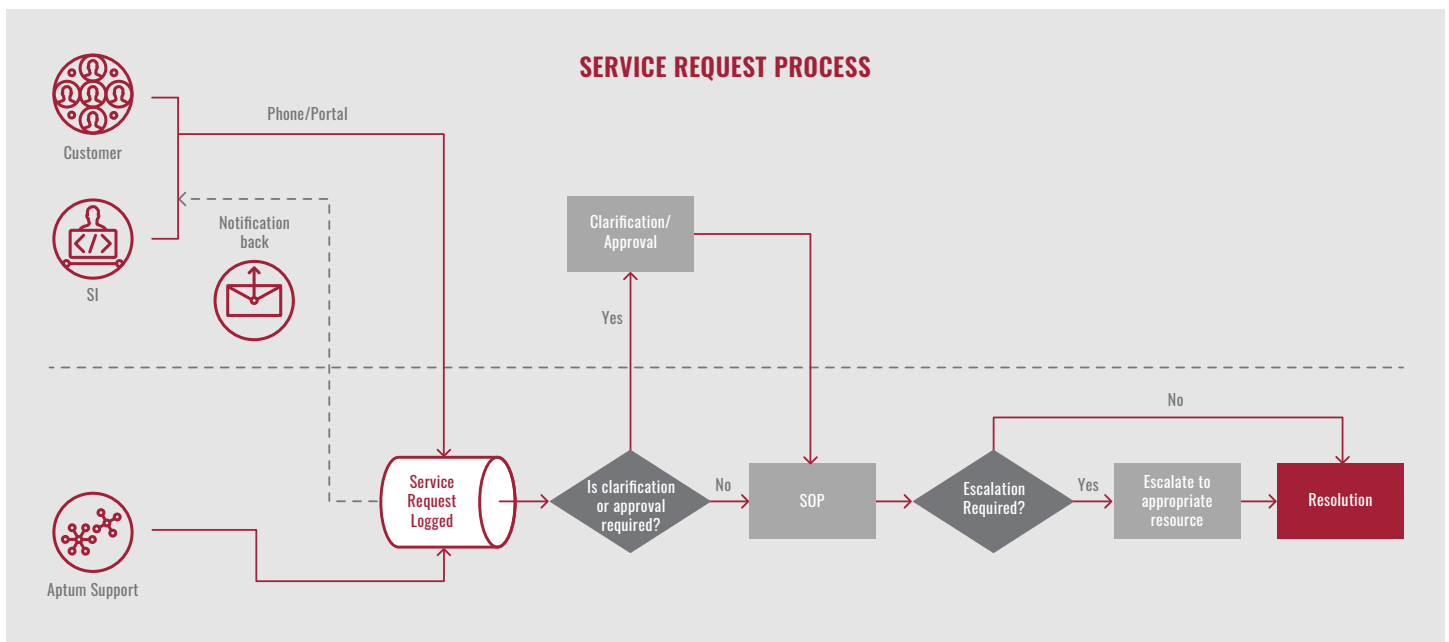
You are encouraged to create a ticket to track any solution changes that you or your development partner are planning to make to the Managed Private Cloud Solution. This ensures the Aptum support team is aware of these activities and can support you through the process.

CUSTOMER OR DEVELOPMENT PARTNER INITIATED CHANGES

Changes to the environment may be requested from your authorized technical contacts on your Aptum account. All changes should be made by opening a service request online, or by contacting the Aptum support team.

APTUM INITIATED CHANGES

In the event that Aptum recommends a change to your solution, you will be notified of the recommendation by phone or email notification. The execution of the change will follow the Service Request process.



Service Request Process Overview

1. For new service requests the first action is to evaluate to ensure all required details and approvals needed to fulfill the request are present.
2. Service requests will be scheduled and/or actioned by the support team or escalated to senior system administrators if appropriate based on the specialized skill sets that will be required.
3. Throughout the process, the support team will work with you as needed and will provide updates through to the point of fulfilment.
4. When service requests are completed they will remain in the resolved status for 14 days to allow you to test or reopen if needed.

10. SERVICE LEVEL AGREEMENT (SLA)

Aptum does not enforce a restrictive SLA where a purchased service is non-redundant (e.g. a single hypervisor host), however when thinking about your Managed Managed Hosting Solution, it is important to design for availability to ensure every step has been taken to minimize downtime caused by maintenance or faults.

Aptum is committed to providing services to you at a standard of excellence commensurate with the best practice in the industry. The following service levels are designed to assure you of ultimate performance and maximal uptime. Each service level specifies the Service it is applicable to, the service level that applies, and how service credits are calculated for each service.

SERVICE	SERVICE LEVEL	REMEDY
Power and HVAC Availability	Aptum guarantees that its power and HVAC system will be available 100% of the time in a given month.	Service credit equivalent to five percent (5%) of the Net MRC of the affected services for each hour (or fraction thereof) of Downtime.
Hardware Replacement Guarantee	Aptum guarantees the functioning of all Hardware [1] and will repair any failed component at no cost to you within 1 hour of Aptum's identification of the failed hardware (the 'Replacement Guarantee'). [2]	Service credit equivalent to five percent (5%) of the Net MRC of the affected services for each hour (or fraction thereof) of Downtime over the stated service level.
SAN Repair and Replacement Guarantee	Aptum will have a technical specialist and the necessary parts on site to begin repairs within 4 hours of Aptum's identification of the problem.	Service credit equivalent to five percent (5%) of the Net MRC of the affected services for each further hour of delay in commencing the work to repair the affected SAN.
Network Uptime	100% uninterrupted transit from Aptum's Network to the Internet.	Service credit equivalent to five percent (5%) of the Net MRC of the affected services for each hour (or fraction thereof) of Downtime.

1. Excludes Aptum's Storage Area Networks (SANs), which are subject to the 'SAN Repair and Replacement' SLA, as well as non-standard products and EOL product lines.
2. The Hardware Replacement Guarantee does not include the time required to rebuild a RAID array or the reload of the operating systems and applications, or changes to hardware during Maintenance, as defined below.

Exceptions

You will not be entitled to any Service Credit under this Service Level Agreement where the Downtime of Unavailability is caused by any of the following:

- I. Maintenance
- II. Suspension or termination of your Services in accordance with the terms of Aptum's Master Services Agreement
- III. Application, software or operating system fault or failure
- IV. Denial of Service attack, hacker activity, or other malicious event or code targeted against Aptum or a Aptum customer (irrespective of DDoS mitigation services provided by Aptum)
- V. Failure of any network or internet infrastructure or technology outside of Aptum's network

Claiming Credits

Aptum does not automatically issue SLA credits, so if you believe that you are eligible for an SLA credit please submit a service request ticket to the Aptum support team who will review the request.

Defined Terms

"Downtime" in respect of an affected configuration or Service, means such service is unavailable because of one of the following:

- a. the Aptum power system are not available ("Power Failure");
- b. a Hardware failure;
- c. an inability to transmit from, or receive data over, the Aptum Network ("Network Failure");

"Hardware" means the processor(s), RAM, hard disk(s), motherboard, NIC card, servers, cabling and associated server hardware listed in the Service and/or the applicable Order together with firewalls, load balancers, and storage area networks listed in the Service and/or the applicable and other related hardware used to provide the Services.

"Maintenance" means Scheduled Maintenance or Emergency Maintenance undertaken by Aptum.

"Scheduled Maintenance" means any maintenance in the Aptum data centre of which you are notified at least 7 days in advance.

"Emergency Maintenance" means any maintenance in the Aptum datacentre that

- a. in Aptum's sole discretion is necessary to avoid an immediate threat to the Aptum data centre or a Customer Service; and
- b. of which you are notified.

"Net MRC" means:

- a. in respect of hosting services, the monthly recurring charge for the affected hosting Service for the configuration experiencing the issue, but excluding any add-on or optional Services which are not included as part of the standard hosting plan but are included as part of such customer's monthly recurring charge.
- b. In respect of all other Services, the monthly recurring charge for the affected Service

"Aptum Network" means all network equipment and cabling extending from the connection of your network access device for your hosting solution up to the uplink port on Aptum's designated border routers that connect to our Transit and Peering Providers.

11. PRODUCT LIFECYCLE

Aptum endeavours to ensure customers are able to maintain fully supported devices and software.

When a new version of a product is released, Aptum will usually change the status of older versions of a product to 'Stop Sale' and these versions will no longer be available to order.

Aptum will 'End of Life' a product or software version when the product or version is no longer supported. A few of examples of why this may occur are inability to source spare parts on a hardware device, or a vendor ceasing production of software and security updates.

When a decision to 'End of Life' a product is reached, Aptum will provide reasonable notice to via email and outline options, including any replacement services, which are available for order.

The Aptum Master Services Agreement found at <https://www.aplum.com/legal/master-services-agreement/> provides additional information on 'End of Life' products.

12. BILLING

Managed Private Cloud solutions are billed on a monthly cycle 1 month in advance at the price agreed on your order.

It is possible for you to choose your preferred monthly billing date by specifying this with our solutions consultant when the solution is ordered, or by creating a service request ticket if the solution has already been deployed.

13. ACCREDITATIONS

Gaining the trust of our customers is the cornerstone of our business. Where we maintain the following key accreditations you can rest assured knowing that our facilities, administration practices, and infrastructure are designed to meet these stringent certifications, while being consistently audited by a third party.

Service Organization Controls (SOC) 1 Report: Type 2

Aptum is compliant with the standards of the AiPA's SOC 1, Type 2 report – referred to also as SSAE (type II), CSAE 3416 and ISAE 3402. What this means is we have undergone extensive, independent, in-depth audits of key control activities, including how the data center, network and hosting services provided to customers are managed.

This accreditation demonstrates that controls are in place over time to shift some of the burden of financial reporting from you to Aptum, so you can use our certification report to satisfy your own auditors.

This accreditation is audited and renewed on an annual basis to ensure internal controls are maintained at the highest of standards.

CIS Membership

Aptum is a member of the Center for Internet Security (CIS). CIS is a non-profit organization dedicated to enhancing the cybersecurity readiness and response among public and private sector companies.

As a CIS community member Aptum has access to Consensus Security Configuration Benchmarks, Scoring Tools & Definitions designed to improve security best practices. Aptum has leveraged these resources to develop Hardened Operating System builds that are available to you if you need an extra level of security on your virtual machines within the Managed Private Cloud Solution.

Please note: CIS hardening for VMware is only available with ESXi v5.5. There are currently no guidelines for versions 6.0 or higher.

14. LIMITATIONS AND REQUIREMENTS

Please note the following important notes relating to Managed Private Cloud:

- It is not possible to change the service level on a Managed Private Cloud solution, this service level is determined and fixed at the time of order.
- You are responsible for ensuring valid software licenses are in place for your installed software and operating systems.
Please note – Microsoft Windows Server is not eligible for License Mobility, this means you are not able to provide your own Windows Server licenses (even if Software Assurance has been purchased).
- Configuration assistance and support are limited to virtual machines with software and Operating systems provided by Aptum and where they are not an End of Life (EOL) version.
- Virtual machines can only be managed if they are running an in life (vendor supported) version of Microsoft windows, Red Hat or CentOS Operating systems.
- To receive Managed Private Cloud services, you will need to provide authorization for Aptum to access your infrastructure solution where necessary to deliver the service.
- By subscribing to a Managed Private Cloud solution, you understand that Aptum will periodically need to perform planned and emergency maintenances on the solution or infrastructure dependencies. Aptum will provide notification in advance of the maintenance wherever possible.
- Aptum will install VMware security patches and minor point versions upon request as part of the Managed Private Cloud service. Major version changes (e.g. from v5.5 to v6.0) will be considered solution upgrades and will need to be scoped as a Professional Services engagement.
- Any additional requests relating to elements outside of the included components and software in the solution will be considered a Professional Services activity and quoted separately.

APPENDIX A - FREQUENTLY ASKED QUESTIONS

Can you help me design a VMware Private Cloud?

Absolutely - our team of VMware certified architects will draw upon their in-depth knowledge to help design a Managed Private Cloud solution that meets your organization's unique requirements and budget.

Can I change the service level?

The Managed Private Cloud solutions are only available with the Managed service level. Full management services are provided for both the VMware solution and virtual machines licensed by Aptum. However, should you wish to self manage your virtual machines it is possible to request removal of the Managed Patching and Antivirus services from your virtual machines.

Are there any limits to the number of support requests I can have?

There are no limits to the number of in-scope support requests that can be logged with each service level, although a fair usage statement applies and customers with a high number of support requests may be encouraged to subscribe to a higher service level to obtain a more comprehensive overall support experience.

APPENDIX B - ROLES AND RESPONSIBILITIES MATRIX

Reducing risk and setting clear expectations around the roles and responsibilities is key to a successful deployment and the management of your Managed Private Cloud solution. The responsibilities matrix below provides you with the necessary details relating to the services included within your Managed Private Cloud Solution. The table also includes best practice recommendations for you and your development partner (where applicable) to consider as you work together, to best support your business applications.

RACI: R = Responsible | A = Accountable | C = Consulted | I = Informed

ACTIVITY	CUSTOMER RECOMMENDED	DEVELOPMENT PARTNER	APTUM RESPONSIBILITY
SERVICE LEVEL ACTIVITIES			
Customer online portal	CI	CI	RA
24/7 response to incident management & service requests via tickets or phone	I	I	RA
Change management through ticketing	RACI	RCI	RCI
SOLUTION DESIGN (PRE-SALES)			
Understand customer business objectives	RACI	RCI	RCI
Deep technical discovery session	CI	CI	RA
Provide detailed implementation requirements	RACI	RCI	RCI
Design solution to reference architecture standards	CI	CI	RA
Select preferred solution from presented designs	RA	R	CI
NETWORK DEPLOYMENT			
Deploy and test included network infrastructure	CI	CI	RA
Configure Aptum side of VPN	CI	CI	RA
Configure non-Aptum side of VPN	RA	RA	CI
Setup FW with Aptum base configuration	CI	CI	RA
Proscribe additional FW policies	RAC	RCI	CI
Implement additional FW policies upon request	CI	CI	RA

ACTIVITY	CUSTOMER RECOMMENDED	DEVELOPMENT PARTNER	APTUM RESPONSIBILITY
OS DEPLOYMENT - MANAGED VIRTUAL MACHINES			
Config base OS to design	CI	CI	RA
Deploy smartkey for Aptum to use	CI	CI	RA
Deploy unsupported OS	RA	R	CI
Setup/install Aptum dependent products (SSL, AV etc)	CI	CI	RA
Setup/install 3rd party products (SSL, AV etc)	CI	RA	CI
Install latest security patches at time of provisioning	CI	CI	RA
Acceptance testing	RA	R	CI
User creation & management	RACI	RI	CI
VMWARE			
vCenter provision and license	I	I	RA
vCenter security	CI	CI	RA
vCenter create and administer HA, DRS, resource pools	CI	CI	RA
Troubleshoot vCenter incidents	CI	CI	RA
ESX host monitoring	CI	CI	RA
ESX host deployments	CI	CI	RA
Troubleshoot ESX host incidents	CI	CI	RA
vNetwork switching implementation	CI	CI	RA
Storage implementation	CI	CI	RA
Builds and configures based on build notes	CI	CI	RA
Patch the VMware hosts as requested by customer	CI	CI	RA
Patch the vCenter Server as requested by the customer	CI	CI	RA
Clone any VMs requested by the customer (approved through a sales order as Professional Services)	CI	CI	RA

ACTIVITY	CUSTOMER RECOMMENDED	DEVELOPMENT PARTNER	APTUM RESPONSIBILITY
VMWARE			
Delete VMs as requested by the customer (service cancelled through Sales)	CI	CI	RA
Configure SRM (Site Replication Manager) - Professional service	CI	CI	RA
Ongoing Management and Monitoring of SRM (site replication manager)	RA	RA	CI
Configure VDP /VEAM Vmware Backup Solution - optional service	CI	CI	RA
Ongoing Management and Monitoring of VDP/VEAM Vmware Backup Solution - optional service	CI	CI	RA
Migrations/Major Upgrades (professional services available)	RA	R	RA
ONBOARDING & OPTIONAL OPTIMIZATIONS			
Technical familiarization & optimization phone call	I	CI	RA
Provide runbook notes confirming actions to be taken for alerts	R	RA	CI
Setup/install 3rd party products	CI	RA	CI
BACKUPS (FOR MANAGED VIRTUAL MACHINES)			
Selecting data backup strategy (choice of backup tools, etc.)	RA	RA	CI
Implement backup strategy	RA	R	CI
Validation & testing of backup strategy	RA	R	CI
Maintenance of local backup script	CI	RA	CI
Initial configuration of scripted database backup (KB) per database, per table	CI	RC	RA
**Installation of Aptum Managed Backup product on client servers	CI	CI	RA
**Notification of backup product failure	CI	CI	RA
**Remediation of backup product failure	CI	CI	RA

ACTIVITY	CUSTOMER RECOMMENDED	DEVELOPMENT PARTNER	APTUM RESPONSIBILITY
BASIC MONITORING & ALERT HANDLING			
Selection of available port checks	RACI	RCI	CI
Configuration of customer select alerts	CI	CI & APTUM	RA
Specification of runbook action incident management of basic alerts	RCI	RACI	CI
Validation of monitoring alerts (testing)	R	RA	CI
Incident management of basic alerts	I	RI	RA
STANDARD MONITORING			
Selection of monitoring level (options)	RACI	R	CI
Monitoring alert threshold tuning (optimization based on requirements)	RCI	RACI	CI
Configuration of alerts	R	RA	CI
Response and remediation of alerts	R	RA	CI
Configure local services to provide data to monitoring service	RCI	RA	CI
PATCHING & ANTIVIRUS (FOR MANAGED VIRTUAL MACHINES)			
OS patches - availability and release (Aptum-YUM)	I	I	RA
OS patches - validation of installation	R	RA	CI
OS patches - exclude packages from update (not recommended)	CI	RA	CI
3rd party application updates	R	RA	CI
Antivirus update availability & installation	I	I	RA

APPENDIX C - ADDITIONAL SERVICES AVAILABLE

Database Administration Packages (DBA) for your Managed Private Cloud

Aptum has in-depth experience and comprehensive services available to provide database support and optimization services for Microsoft SQL Server, MySQL, MariaDB and PerconaDB.

We provide the expertise needed to optimize databases through our DBA Program at a fraction of the cost of hiring in-house MySQL certified DBAs. The DBA Program assigns a highly experienced database administrator to work directly with you to tune database solution performance, security and resiliency.

Please ask us about our Database Administration plans. These are available for services in the cloud.

Design Build and Migration Services

Technology is in a constant state of change, and just as your business needs change, products and features change and technology evolves. Designing the right cloud for your strategic goals is critical to your success but this transformation can become complex and expensive.

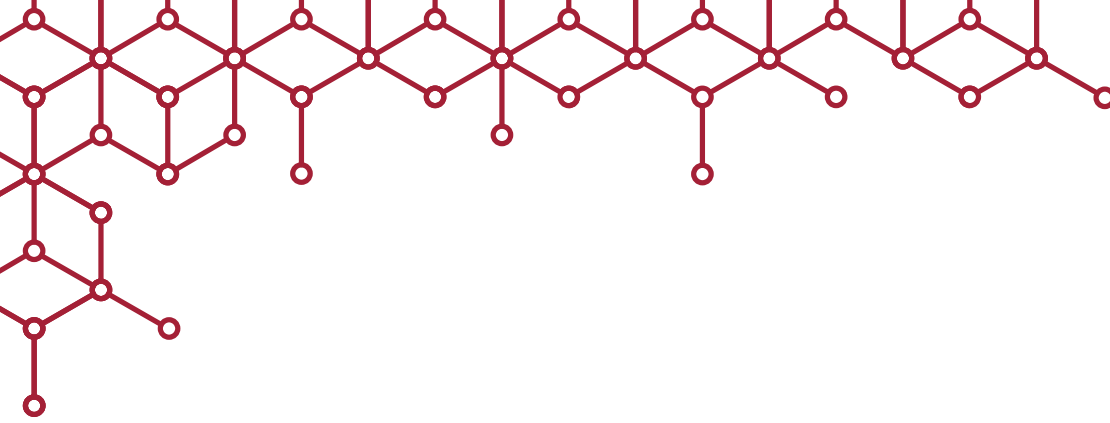
Aptum Design Build services help customers build highly secure and efficient infrastructure that supports missioncritical business functions and scales with their organization as they grow. Design Build services are delivered through four phases that include consultation, architecture, deployment, and testing. With one single sourced process, customers can lower cost and decrease time-to-market.

Migration Services are available as part of our Professional Services portfolio to help you migrate services between solutions with minimal risk. All services are provided on a time and materials basis, delivered by either Aptum in-house resources, or an approved specialist Migration Partner and are subject to a scoping exercise in advance.

If you are interested in the Design Build or Migration Services you should speak with one of our solutions consultants about this service to learn more.

LEARN HOW APTUM CAN UNLOCK THE POTENTIAL OF YOUR DATA INFRASTRUCTURE.

Visit www.aplum.com or email info@aplum.com



ABOUT APTUM TECHNOLOGIES

Aptum Technologies enables customers to unlock the potential of their data infrastructure to drive tangible business outcomes and maximize the value of their technology investments. Aptum's Data Center, Cloud, Hosting and Connectivity solutions, underpinned with expert Managed and Professional Services, offer genuine choice and adaptability combined with international reach spanning North America, Latin America and Europe. In Canada, through its Fiber business, Aptum is the first neutral host provider of turnkey small cell connectivity, augmenting an extensive metro network across Toronto and Montreal. Aptum is a portfolio company of Digital Colony, a global investment firm dedicated to strategic opportunities in digital infrastructure. For more information, visit www.aptum.com.