III. Description of SoftLayer Technologies, Inc.'s IBM Cloud Infrastructure as a Service (IaaS) System

A. System Overview

Background

SoftLayer Technologies, Inc., also referred to as "IBM Cloud IaaS," an IBM Company, provides on-demand cloud infrastructure as a service to its customers, allowing them to create scalable bare metal server, virtual server, or hybrid computing environments, via IBM Cloud IaaS's Customer Portal, leveraging global data centers and points of presence (PoP).

IBM Cloud IaaS is built using a Network-Within-A-Network topology that provides remote access to allow customers the ability to build and manage computing environments remotely. IBM Cloud IaaS's "Network-Within-A-Network" configuration includes three (3) network interfaces. Public, private, and management traffic travel across separate network interfaces, segregating and securing traffic while streamlining management functions.

- Public Network - Network traffic from anywhere in the world will connect to the closest network PoP, and it will travel directly across the network to its data center, minimizing the number of network hops and handoffs between providers.
- Private Network - Provides a connection to the customer's servers (bare metal or virtual) in IBM Cloud IaaS data centers around the world. Data can be moved between servers through the private network; and customers can utilize various services, update and patch servers, software repositories, and backend services, without interfering with public network traffic.
- Management Network - Each server within the IBM Cloud IaaS is connected to the management network. This out-of-band management network, accessible via VPN, allows access to each server for maintenance and administration, independent of its CPU and regardless of its firmware or operating system.

The following products and services are delivered within the IBM Cloud IaaS system boundary:

- Networking: IBM Cloud Load Balancers, IBM Cloud Direct Link (Connect, Dedicated, Dedicated Hosting, Exchange), Hardware Firewall and Hardware Firewall (Dedicated), Gateway Appliance, IPSecVPN, Fortigate Security Appliance
- Storage: IBM Cloud File Storage, IBM Cloud Block Storage, IBM Cloud Backup, IBM Cloud Object Storage (IaaS),
- Compute: IBM Cloud Bare Metal, IBM Cloud Virtual Servers, SAP-Certified Cloud Infrastructure
- Security: IBM Cloud Hardware Security Module (HSM)

IBM Cloud IaaS delivers its services through the Internal Management System (IMS), which is an internally developed customer relationship management (CRM) system used to track customers' hardware and services. IMS allows customers to manage their cloud environments. Customer capabilities include management of system and network devices provisioned by the customer, account management, ordering and deployment, and customer support.

IMS has two components: IMS, as viewed by internal employees, and the Customer Portal, as available to users of IBM Cloud IaaS. The Customer Portal allows customers to:

- Create and manage tickets for incident response and resolution
- Review account information
- View information and certain configuration data regarding their purchased solutions
- Perform functions such as OS reloads, and access RescueLayer
- Maintain customer provisioned firewall and DNS configurations that affect their bare metal servers
- Purchase or upgrade services to initiate the automated provisioning process for new systems

Customers build their environments using virtual servers and/or bare metal servers.

- Virtual servers are computing "instances" that are complete computing environments that include a full hardware and software stack accessed and controlled over the Internet. The computing resources can be scaled on demand, adding or resizing instances as needed, but without having to purchase physical systems. Public and private virtual nodes are available.
- Bare metal servers are dedicated physical servers. Bare metal servers allow direct access to physical hardware to support high demand and processor-intensive workloads.

IBM Cloud IaaS personnel also have access to IMS to set up and configure purchased solutions, assist in troubleshooting technical issues, and respond to customer requests.

Service Commitments and System Requirements

Customers are required to agree to a Cloud Service Agreement (CSA) when signing up for an IBM Cloud account. The CSA is available to customers through the Customer Portal and acts as the formal contract and usage policy for customer users of the IBM Cloud IaaS system. The CSA documents the contractual obligations of IBM Cloud IaaS and the customers using IBM Cloud IaaS, including principle service commitments and system requirements. Any updates to the CSA are communicated to the existing customer through email.

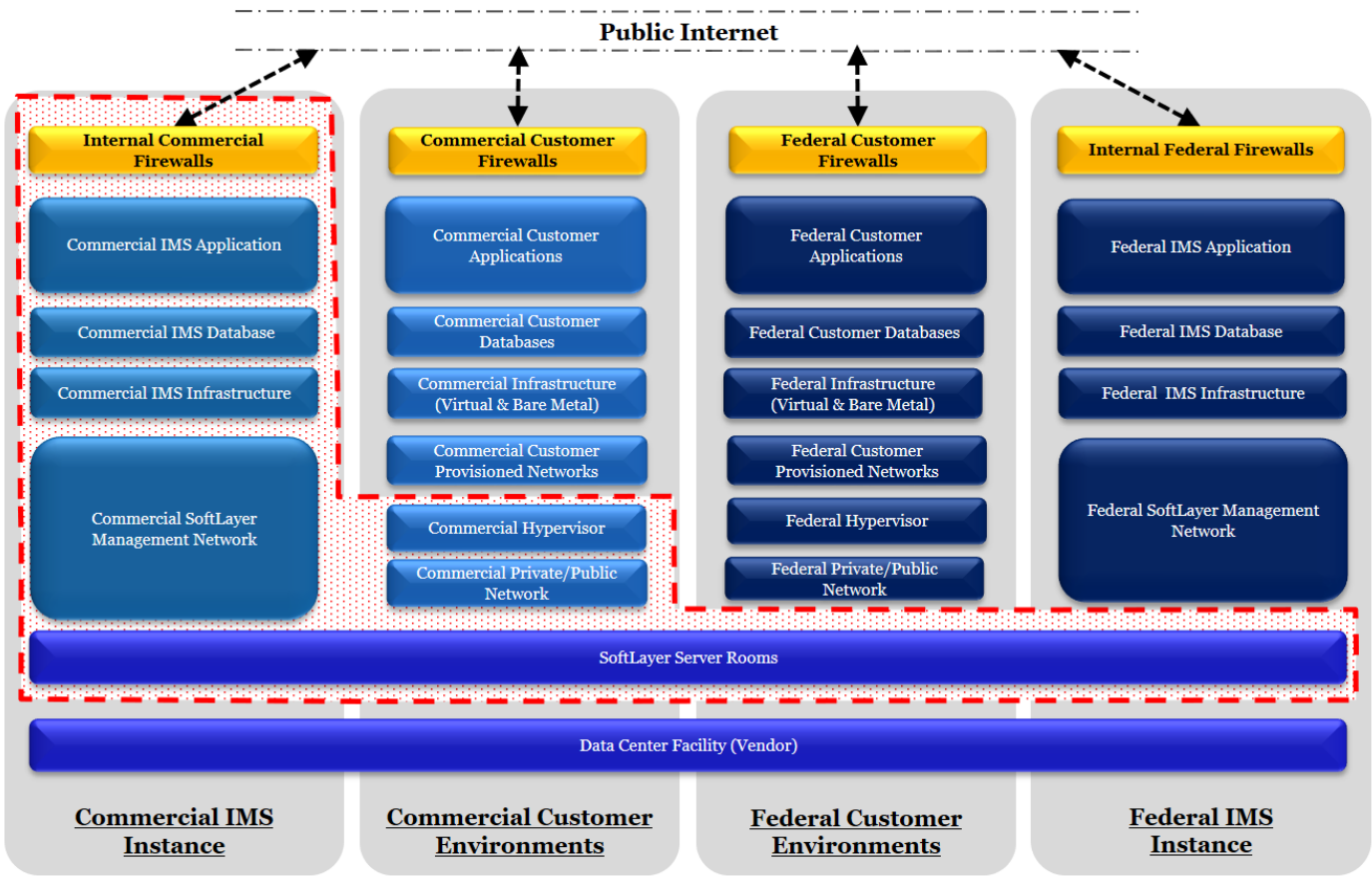
Only the principle service commitments and system requirements relevant to the applicable trust services criteria are within the boundaries of the system. The relevant service commitments and system requirements are included within the following sections of the CSA:

- Cloud Services
- Content and Data Protection

  Included within c. of the section is a link to IBM's Data Security and Privacy Principles for IBM Cloud Services (DSP). Relevant service commitments and system requirements are included within the following sections of the DSP:
  - Data Protection
  - Security Policies
  - Security Incidents
  - Physical Security and Entry Control
  - Access, Intervention, Transfer and Separation Control
  - Service Integrity and Availability Control
- General

Principle service commitments and system requirements within the boundaries of the system are outlined further in the sections below.

Boundaries of the System



The boundaries of this report cover the services managed by IBM Cloud IaaS, including global data center physical locations, the IMS portal and the supporting infrastructure devices.

The boundary includes network devices that are managed by IBM Cloud IaaS and infrastructure (including hypervisors) that support customer environments. These network devices are not provisioned/managed by customers within the IBM Cloud IaaS. Customer are responsible within their commercial customer environment for management of servers, virtual machines (VMs), and other systems/devices including the implementation, configuration, and maintenance of such.

The following products and services are delivered from within the IBM Cloud IaaS Scope and are provisioned via IMS. Customers are responsible for the implementation, configuration, and maintenance within their environment.

Networking

IBM Cloud Load Balancers enable customers to utilize public (internet facing) and private (internal) load balancing to distribute traffic between application servers deployed locally within IBM Cloud data center.

IBM Cloud Direct Link (Connect, Dedicated, Dedicated Hosting, Exchange) enables customers to establish a point-to-point connection from their location to the cloud infrastructure terminating at IBM network points of presence (PoPs); it is delivered from within the security boundary via a series of Layer 3 switches and routers (XCS/XCR/MBR/BCR/BAS/BCS). Customers are responsible for ordering their single mode fiber cross-connections and are responsible for the configuration of their router. Customers are provided with an IP allocation for point-to-point connection configuration; additionally, they will be assigned a /24 (254 usable IPs) for their remote hosts.

Hardware Firewall and Hardware Firewall (Dedicated) is a FortiGate device which allows customers to protect multiple VLANs using firewall rules, application control, anti-malware, and advanced inspection technologies.

Gateway Appliance is a customer managed offering providing a selection of AT&T Vyatta 5600 vRouter or a Juniper vSRX devices that allows the customer to manage their physical and virtual networks for VLAN routing, firewall and VPN management and traffic shaping.

IPSecVPN is a service available to customers to facilitate management of their environment using an encrypted VPN tunnel.

Fortigate Security Appliance is a customer managed, high throughput firewall that provides them with enhanced granular control over their networks.

Storage

IBM Cloud Block Storage is a persistent storage option available for Cloud Virtual and Bare Metal Servers.

IBM Cloud File Storage is a flash-backed NFS-based file storage system that allows customers to increase storage capacity and adjust performance based on workload demands.

IBM Cloud Backup is a recovery system the customer manages, enabling customer to securely backup data between IBM servers in one or more IBM Cloud data centers.

IBM Cloud Object Storage (IaaS) is across-regional, unstructured, scalable, and persistent data storage service designed to support exponential data growth.

Compute

IBM Cloud Bare Metal is a dedicated physical server. Bare metal servers allow direct access to physical hardware to support high demand and processor-intensive workloads.

SAP-Certified Cloud Infrastructure is dedicated physical server purpose-built for SAP workloads.

IBM Cloud Virtual Servers is a computing "instance" that is a complete computing environment that includes a full hardware and softaware stack access and controlled over the Internet. The computing resources can be scaled on demand, adding or resizing instances as needed, but without having to purchase physical systems. Public and private virtual nodes are available.

Security

IBM Cloud Hardware Security Module (HSM) is a standalone appliance that provides dedicated single-tenant encryption and key management.

Within each customer environment, servers, VMs and other systems/devices are managed by IBM Cloud IaaS's customers and are not included within the boundaries of the system. This report does not extend to the workloads (data, files, information) sent by IBM Cloud IaaS customers to the IBM Cloud IaaS system. The integrity and conformity with regulatory requirements of such data are solely the responsibility of the applicable IBM Cloud IaaS customer. Additionally, the boundaries of this report do not extend to business process controls, automated application controls, or key reports.

IBM Cloud IaaS provides services to the Federal government and Department of Defense (DoD) via the FedRAMP and Defense Information Systems Agency (DISA)/DoD programs in two data centers (DAL08 and WDC03). A separate instance of IMS (FedIMS) provides provisioning functionality and infrastructure management. These data center facilities are included within the physical security boundaries of the system, however, other aspects of the services including the FedIMS system and its processes, are not included within the boundaries of the system.

The accompanying description includes only those controls directly impacting IBM Cloud IaaS and customers' hosting environments utilizing IBM Cloud IaaS detailed in this system description. IBM Cloud IaaS also provides enterprise-class tools to help mitigate potential security risks and ensure availability. Tools provided by IBM Cloud IaaS include, but are not limited to, load balancing, intrusion detection and prevention, standard and dedicated hardware firewalls, anti-virus, anti-spyware, anti-malware, VeriSign® and GeoTrust® SSL Certificates. This report does not extend to controls over IBM Cloud IaaS's other services and tools.

Components, infrastructure, network devices, software, and data center locations within the scope of the system:

<table>
<tr><th>Service Offering</th><th>Data Center / Hardware Locations</th><th>Network</th><th>Operating System Infrastructure</th><th>System Software</th><th>Applications</th><th>Customer Data</th></tr>
<tr><td rowspan="3">IBM Cloud
IaaS</td><td rowspan="3">46 data centers
(See Infrastructure section below)</td><td>Customer provisioned and managed network devices, firewalls and VPNs are solely the responsibility of the customer and are not within the boundaries of the system.</td><td colspan="3" rowspan="2">Customer environments (including the development and maintenance) provisioned and managed using the Customer Portal, including OS, system software, and applications are solely the responsibility of the customer and are not within the boundaries of the system.</td><td rowspan="3">Customer data is solely the responsibility of the customer and is not within the boundaries of the system.</td></tr>
<tr><td>Network devices supporting customer managed environments and managed by IBM Cloud IaaS are within boundaries of the system including:
Routers, Switches, Firewalls, VPNs</td></tr>
<tr><td>Network devices directly in support of the IMS portal are within the boundaries of the system including:
Routers, Switches, Firewalls, VPNs</td><td>Operating systems directly in support of the IMS portal are within boundaries of the system including:
Linux, UNIX, Windows, CentOS</td><td>System software directly in support of the IMS portal are within boundaries of the system including:
Radius, Citrix, Active Directory</td><td>Internal Management System (IMS)/ Customer Portal</td></tr>
</table>

B. System Components

Infrastructure

IBM Cloud IaaS provides infrastructure as a service using multiple telecom service providers for backbone connectivity and multiple co-location management providers for data center facility management. Refer to the table below for a list of data center vendors that provide facility management services in the IBM Cloud IaaS facilities included within the scope of this report.

Facility *	Physical Location	Facility Manager
AMS01	Amsterdam, Netherlands	Digital Realty
AMS03	Almere, Netherlands	NL|DC
CHE01	Chennai, India	TATA
DAL02	Dallas, TX	SoftLayer
DAL05	Dallas, TX	Digital Realty
DAL06	Dallas, TX	SoftLayer
DAL07	Plano, TX	SoftLayer
DAL08	Richardson, TX	Digital Realty
DAL09	Richardson, TX	Digital Realty
DAL10	Irving, TX	QTS
DAL12	Richardson, TX	Digital Realty
DAL13	Carrollton, TX	Cyrus One
FRA02	Frankfurt, Germany	Cyrus One
FRA04	Frankfurt, Germany	E-Shelter
FRA05	Frankfurt, Germany	Interxion
HKG02	Hong Kong, China	Digital Realty
HOU02	Houston, TX	SoftLayer
LON02	Chessington, UK	Digital Realty
LON04	Farnborough, UK	Ark Data Centres
LON05	Hemel Hempstead, UK	NTT
LON06	Slough, UK	Cyrus One
MEL01	Melbourne, Australia	Digital Realty

Facility *	Physical Location	Facility Manager
MEX01	Queretaro, Mexico	Equinix
MIL01	Milan, Italy	DATA4
MON01	Montreal, Canada	COLO-D
OSL01	Oslo, Norway	EVRY
PAR01	Paris, France	Global Switch
SAO01	Sao Paulo, Brazil	Ascenty
SEA01	Tukwila, WA	Internap & Sabey
SEO01	South Korea	SK C&C
SJC01	Santa Clara, CA	Digital Realty
SJC03	Santa Clara, CA	Digital Realty
SJC04	Santa Clara, CA	Stack Infrastructure
SNG01	Jurong East, Singapore	Digital Realty
SYD01	Sydney, Australia	Global Switch
SYD04	Erskine Park, Australia	Digital Realty
SYD05	Sydney, Australia	Equinix
TOK02	Tokyo, Japan	@Tokyo
TOK04	Saitama, Japan	Softbank
TOK05	Tokyo, Japan	NTT
TOR01	Ontario (Markham), Canada	Digital Realty
WDC01	Chantilly, VA	Digital Realty
WDC03	Ashburn, VA	Digital Realty
WDC04	Ashburn, VA	Digital Realty
WDC06	Ashburn, VA	Raging Wire
WDC07	Ashburn, VA	Sabey

* Note: Only those data centers that were operational and hosting customer servers for at least six (6) months are considered in scope for this report.

Customers with bare metal, virtual, or hybrid environments can access the servers remotely (electronically) from anywhere in the world. Certain facilities (i.e., DAL02, DAL07 and HOU02) house both co-location servers and infrastructure as a service-related servers. Co-location customers do not have logical or physical access to the IBM Cloud IaaS system. As such, co-location cages housing customers' servers are not included within the boundaries of the system.

Physical Security

Each data center building may contain multiple server rooms (SR), which are designated as separate areas of the data center, whether separated by a cage or through a room enclosure. Each server room is typically made up of one pod and built to the same specifications to support up to 5,000 servers. Leveraging this standardization across geographic locations, IBM Cloud IaaS optimizes key data center performance variables including space, power, network, personnel, and internal infrastructure.

Physical access is controlled through key card proximity systems at each facility and server room. Access to and throughout each facility, including sensitive areas, such as electrical, generator, UPS, batteries, fire riser/sprinkler, and HVAC equipment is restricted, and server room access is limited to authorized personnel. Each facility except DAL02, DAL06, and HOU01 has two-factor authentication with a biometric system and require a key card. The facilities noted above are also restricted but only require key card authentication.

Each data center has a full-time IBM Cloud IaaS site manager on-site. The site manager and members of the facility teams are responsible for monitoring the IBM Cloud IaaS server rooms on a daily basis and reporting any compromised access or environmental issues to the facility vendor for remediation. The vendors monitor the physical access systems centrally at each location and will alert the IBM Cloud IaaS site manager to any unauthorized access attempts. Major events are communicated by the IBM Cloud IaaS site manager to the central IBM Cloud IaaS Facilities Team.

Surveillance cameras are strategically located within in each data center to deter unauthorized access. Security personnel monitor key card access throughout the building in real time and address any issues, such as emergency doors ajar, doors left open, and failed access attempts. At each data center, failed access attempts are logged and available for follow-up as necessary. Security events are communicated to the IBM Cloud IaaS site manager and to the central IBM Cloud IaaS Facilities Team, as necessary.

IBM Cloud IaaS personnel are provided physical access based on their job responsibilities. Access to data centers for new hires and transfers is formally requested and requires approval based on job responsibility and location. Approved new hire access requests are sent to the IBM Cloud IaaS Facilities Team to provision access to IBM Cloud IaaS managed facilities. For vendor owned sites, approved requests are sent to the respective vendors to provision access. Physical access privileges are reviewed on a quarterly basis to verify access is appropriate. When an IBM Cloud IaaS employee is terminated, a notification is sent to responsible personnel and access privileges are revoked by the Facilities Team for IBM Cloud IaaS sites and the facility vendors for vendor owned sites within five (5) business days of termination.

Individuals requiring access to the data center without an authorized key card, such as visitors, customers, contractors, or vendors must sign in at the security desk or with the Data Center Control Room (DCR). Visitors are required to be escorted by authorized personnel. The individual must provide a valid government issued photo identification card for identity verification. Visitors at data centers are required to wear identification cards to distinguish the person as a visitor. Temporary key cards are disabled after a predefined time, typically a 24-hour period.

Environmental Controls

Data center facilities are managed and maintained to ensure adequate environmental controls are in place for the protection of equipment and the availability of customer data and services provided. Management reviews maintenance reports performed on a periodic basis to determine and schedule additional maintenance, where necessary. The following environmental controls exist at each center:

- Fire detection and suppression systems, including pre-action dry pipe, hand-held fire extinguishers, smoke detectors, and fire alarms;
- Backup power, including uninterruptable power supply (UPS) units and redundant generators (Global Switch Paris, Global Switch Australia and Ascenty Brazil utilize diesel rotary UPS (DRUPS) units);
- Power distribution units (PDU) and electrical panels; and
- Heating and cooling (HVAC) mechanisms, such as computer room air conditioning (CRAC) units, computer room air handlers (CRAH), chillers, and temperature and humidity monitoring and control.

At IBM Cloud IaaS and vendor managed facilities, IBM Cloud IaaS and Data Center Operations personnel perform an inspection of the data center during each shift to monitor temperature and humidity and to verify that environmental controls are operating as intended. Physical walkthroughs are performed by specialized and trained security personnel, facility provider engineering personnel and IBM Cloud IaaS personnel to monitor various aspects of each facility. IBM Cloud IaaS site managers monitor the maintenance records as evidence of continuous monitoring of each data center site.

The environmental protection systems are inspected and/or tested, as necessary, by approved vendors in accordance with local, city and state regulations. UPS/DRUPS units are located in dedicated areas. The primary UPS (providing backup power to the servers) is tested on a periodic basis under load conditions and performance results are monitored. Additionally, each data center facility is equipped with generators that automatically supply power to the facility in the event of outside power failure. Maintenance contracts are in place to ensure the equipment is maintained to certain specifications. The fire detection and suppression systems are tested on an annual basis. HVAC equipment, depending on the type, is maintained on a periodic basis. Maintenance is performed at each data center facility, either by IBM Cloud IaaS personnel or certain vendors. Maintenance records are monitored and reviewed by IBM Cloud IaaS site managers at each data center facility. Any deviations regarding scheduled maintenance activities are communicated to the central IBM Cloud IaaS facilities team.

Software

Overview

IBM Cloud IaaS customers are solely responsible for customer owned and managed software and applications as these components are not within the boundaries of the system. IBM Cloud IaaS does not maintain responsibility for customer software and applications that IBM Cloud IaaS customers run on their bare metal, virtual, or hybrid environment; the software and applications are the responsibility of IBM Cloud IaaS customers.

For components of the environment managed by IBM Cloud IaaS, software systems are managed centrally by IBM Cloud IaaS using consistent controls and processes. IBM Cloud IaaS manages the Customer Portal (IMS), IMS infrastructure and operating systems, network devices supporting IMS and certain network devices supporting customer environments within the IBM Cloud IaaS environment.

IBM Cloud IaaS Managed Component	**Software Managed**
IMS Database	• Oracle
IMS Infrastructure	• Various Unix OS • Windows
Customer Portal / IMS	• Proprietary Software Developed by IBM Cloud IaaS

In addition, IBM Cloud IaaS manages certain shared network devices that support customer environments. RADIUS software is used to manage customer's network devices.

Logical Security

Customers Access to Customer Portal (IMS)

Customer interactions with the Customer Portal (IMS) are restricted based on the authorization level required by the user. If the user is a "master" (a user with privileges granted to a customer using the Portal), that user can create other user accounts with varying levels of authorization. This includes the creation of other master users based on the customer's requirements.

Customer users are required to have a unique login and password. Minimum password parameters exist for customer access to the Customer Portal. Within IMS, the customer manages the users within their respective organization and related permissions.

Specifically, the following controls are not within the boundaries of the system within this report:

- Managing and reviewing customer access to IMS;
- Verifying that only authorized and properly trained customer personnel are allowed logical access to IBM Cloud IaaS systems via the provided IBM Cloud IaaS logins, including the mobile website and mobile applications, and the IBM Cloud IaaS provided VPN; and
- System access to the Customer Portal and hosted equipment (servers) is appropriately administered by user entities:
    - Passwords are changed periodically,
    - Passwords are kept confidential,
    - Security violations are monitored and followed up as necessary,
    - Provisioning of new customer users and granting of additional customer access permissions are properly authorized, and
    - Termination processes include timely notification and disabling of access rights.

Access to IMS, IMS Infrastructure and Network Devices by IBM Cloud IaaS Personnel

IBM Cloud IaaS personnel access IMS to investigate customers' issues and to provide technical support. There are two primary mechanisms for an IBM Cloud IaaS employee to modify/update customers' bare metal server: through IMS and its functionality, or through directly accessing customers' environments. Credentials associated with customers' bare metal, virtual, or hybrid environments are stored in IMS to assist in troubleshooting issues. Support personnel cannot directly access customers' virtual servers, and in the rare instance where support is required, it is provided through the XenCenter management console. Customers are solely responsible for managing their bare metal and virtual servers. As a result, bare metal and virtual server technical support provided by IBM Cloud IaaS is at the direction and sole discretion of the customer and not within the boundaries of the system.

Access to the IBM Cloud IaaS production environment, including IMS, IMS infrastructure and network devices, by IBM Cloud IaaS personnel requires unique user credentials authenticated through IBM Cloud IaaS's Active Directory. Active Directory is the central user access administration tool used to provide access to the IBM Cloud IaaS production environment. IBM Cloud IaaS has configured minimum requirements for Active Directory passwords, including minimum character length, complexity, password history, and expiration. If accessing the IBM Cloud IaaS environment from outside an IBM Cloud IaaS office location, IBM Cloud IaaS employees are required to access the IBM Cloud IaaS network via VPN utilizing token-based, two-factor authentication that enforces the established minimum password parameters. Additionally, the token requires a six-digit security code that changes every 30 seconds.

New hires that require IBM Cloud IaaS production access are authorized and access is granted based on job responsibilities. An annual continued business need revalidation is performed over Active Directory user IDs with access to the IBM Cloud IaaS production environment to determine that continued access is still required. Additionally, a quarterly business need revalidation is performed over Active Directory groups/users with privileged access to determine that IBM Cloud IaaS privileged user ID access is still required. Active Directory groups/users with privileged access

is defined as users with administrator access to the bastion hosts controlling access to the IaaS production environment. Administrator access to the bastion hosts allows authorized IBM Cloud IaaS employees to add/modify/delete access to the IBM Cloud IaaS production environment, including IMS, IMS infrastructure and network devices. Exceptions identified during the revalidation process are remediated.

In the event that an employee resigns, is terminated or transfers, the user's logical access is revoked within five business days of termination. A quarterly employment verification is performed over Active Directory user IDs with access to the IBM Cloud IaaS production environment, in accordance with the defined security policy, to determine that the owner of a user ID is still employed. Exceptions identified during the verification process are remediated in accordance with the defined security policy.

Device Sanitization

Once it is determined that a returned device should be repurposed or reused, the device is cleansed of any existing data by the IBM Cloud IaaS Inventory team through, either, the 1) a standard reclaim process 2) an ad hoc manual process or 3) for HSM appliances the factory restore process.

1) The standard reclaim process occurs when a server is still useable but no longer needed by the customer (i.e. server upgrade). When a server is marked for reclaim, drives within that server at the time of the reclaim are required to undergo device sanitization. Reclaims occur at the server level by wiping (i.e. reformatting) the drives and entering back into IBM Cloud IaaS inventory upon completion. A majority of devices in the environment are sanitized through the standard reclaim process.
2) The adhoc process is invoked when a particular drive on a given server needs to be replaced due to a drive upgrade or corruption. In the adhoc process, the drives are stored in a small parts bin and held for a least seven days in the event that the customer requires the drive be physically returned. After the seven-day waiting period, the drive is entered into the format server where a manual BDS wipe sanitizes the drive of any existing data.

Device Destruction

Once a hard drive is determined to be at the end of its functional life, the drive is requested to be physically destroyed. Upon completion, the drive is physically destroyed by bending and breaking its internal components, including the data platters. This results in the inability to "spin" or use the hard drive. The physical destruction process is tracked using the serial number on the hard drive. Details of physical destruction are maintained in IMS.

Workstation Security

IBM Cloud IaaS workstations employ a diagnostic tool that checks for core workstation security features, which automatically correct issues, or notifies workstation users of noncompliance. These checks include: hard drive security (password protection or full disk encryption); screen saver; antivirus; firewall; database encryption, if required based on data sensitivity; workstation user account passwords; operating system pack level and security patch currency; as well as checks to verify certain features are not enabled such as file sharing capabilities.

When non-compliance issues are identified, email notifications are sent to the registered user of each workstation requiring remediation. If not resolved, escalations via email are sent to managers of the employees that are not in compliance with the workstation policy, until the issue is resolved.

Network Security

Network Segregation via VLANs

Internal boundaries are established and maintained through dedicated VLANs leveraging custom automated ACLs (Access Control Lists). To segregate customer traffic, IBM Cloud IaaS utilizes 802.1Q VLAN tagging for traffic within its data centers. Each bare metal server or virtual server will be automatically assigned a dedicated VLAN secured with custom ACLs within the environment and only traffic tagged with that VLAN ID will be routed to or from systems authorized to send or receive on the VLAN. Specifically, VLAN tagging is configured to segment individual customers from other customer environments and the IBM Cloud IaaS Management network.

Vulnerability Scanning

Vulnerability scans are executed nightly across the external network IP ranges via the Security Center tool. After the vulnerability scan is complete, a report is generated, and any vulnerabilities identified are assigned severity levels based on the security policy.

Vulnerabilities identified are tracked and remediated based on severity levels, as necessary, per the requirements of the security policy. Implementation of corrective actions are administered through the change management process. Monitoring is performed to ensure the timely patch implementation for vulnerabilities identified. Per IBM Cloud IaaS's security policy, critical patches are implemented in three to seven days.

Intrusion Detection

IBM Cloud IaaS network ports are protected with firewalls, specifically Palo Altos, which serve as the intrusion detection (IDS) and intrusion prevention (IPS) agents, and ASA firewalls that govern remote access activity. IBM Cloud IaaS traffic in and out of the network must pass through both the Palo Alto and ASA firewalls. IBM Cloud IaaS uses the IBM QRadar tool, an enterprise security information and event management (SIEM) product, to monitor this traffic and events. ASA and Palos Alto firewalls are configured to define which activity is logged and sent to the syslog server. The syslog server sends logged events within the syslog to QRadar, which monitors production IDS activity logs. Based on the nature, frequency, severity, and other activity log characteristics, a series of pre-defined rules enabled in QRadar will automatically flag events (or a combination thereof) as Offenses. The Security Operations Center (SOC) team monitors Offenses real-time and analyses to determine if the offense is a false positive or, whether the incident responses process should be invoked. If the offense is deemed to need further action, the SOC team will

open a resilient (SIP) ticket to remediate the offense. The Security Incident in Progress (SIP) ticket will follow the standard incident management process.

Firewall Rule Revalidation

The IBM Cloud IaaS Network Engineering team has identified the firewalls that are in place to protect the IaaS system and performs a firewall rule revalidation over the firewalls on a semi-annual basis. For each firewall, the team reviews the rules that allow open ports and traffic and compares the rules against the baseline configuration that was approved by the VP of Risk Management. For any differences against the baseline configuration, the Network Engineering team will ensure that an approved change ticket exists to document the need for a firewall rule. If an approved change ticket cannot be found, the team will determine if the rule should exist and submit a change ticket to get the rule installed. If it is determined the rule should not be in place, the rule will be removed, and the Network Engineering team will investigate how the rule was created.

Penetration Testing

External penetration tests are conducted on the IBM Cloud IaaS. The penetration tests are designed to discover IT security flaws that could be exploited by a malicious attacker to compromise internal systems and data. The assessments are conducted in three phases: Reconnaissance, Exploitation, and Post-Exploitation. As an outcome of the review, recommended solutions are proposed to mitigate or remediate the flaws identified.

Secure Data Transmissions

Customer interactions with the portal (IMS) are encrypted end-to-end utilizing 128 bit or 256 bit Secure Sockets Layer (SSL) protocols including cloud.ibm.com, and the mobile applications' API URL as each website utilizes a TLS 1.2 encrypted connection. IBM Cloud IaaS requires external facing certificates to be signed by a well-known Certificate Authority, such as DigiCert Inc.

In addition to the primary Customer Portal, the customer can also utilize a mobile application on an Apple iOS or Google Android device. IBM Cloud IaaS mobile application communications require the use of HTTPS secure socket protocol accessible via https://api.softlayer.com/ and https://api.softlayer.com/mobile/v3/. Interactions with the mobile-ready website and mobile applications are encrypted end-to-end utilizing 128 bit Secure Sockets Layer (SSL) protocol. Additionally, remote access mechanisms to the Customer Portal are encrypted.

Data at Rest Encryption

Systems that store IMS data are subject to data at rest encryption requirements. IBM Cloud IaaS IMS data is stored within the primary Oracle databases at the DAL10 and WDC04 data center facilities. IBM Cloud IaaS enforces data at rest encryption at the database level utilizing Advanced Encryption Standard (AES) encryption and key management systems separating encryption keys from the data they encrypt.

Incident and Security Incident Management

IBM Cloud IaaS's incident response policy covers threat events, threat sources, and scenarios that may affect the security and availability of the company's information assets. The Network Operations Center (NOC) and Security Operations Center (SOC) are responsible for monitoring the IBM Cloud IaaS environment and manage the identification, response and resolution of incidents. Through the NOC and SOC, IBM Cloud IaaS provides 24/7 monitoring of data centers. IBM Cloud IaaS utilizes a variety of tools, in combination, to monitor, mitigate, and resolve potential issues. Each data center also has its own local Data Center Control Room (DCR), which is used to monitor and resolve potential issues locally.

Network Reliability Engineering (NRE) and Security Operations Center (SOC)

The NRE monitors network traffic and operations metrics to identify potential network issues that may disrupt service and impact security. The SOC monitors security alerts to identify potential security issues that may disrupt service and impact security. The NRE and SOC are notified of incidents in a variety of ways:

- E-mail received from public aliases or internal aliases.
- Phone calls from telecom circuit providers, network engineers, customers, peering ISPs, transit providers, data center vendors or other internal groups at IBM Cloud IaaS.
- Review of tickets escalated to the NRE/SOC through the "Network Operations" or "Security Operations" ticket queues.
- The NRE monitors alerts from network monitoring tools using a variety of tools, including PeakFlow, Netcool, IP Alert, Nagios, GROK (syslog parser), and Regex. Additionally, the SOC monitors alerts using a variety of tools, including QRadar and FireEye.

The team member that identifies the issue or receives the initial notification of a Customer Impacting Event (CIE) or security incident creates a ticket unless an existing ticket already exists. Tickets generated by NRE are documented in ServiceNow as Customer Impacting Events (CIEs) and SOC tickets are documented in JIRA as Security Incidents in Progress (SIP). If a ticket regarding the same incident already exists, any new information is documented in the existing CIE or SIP notes. CIEs and SIPs are classified based on criticality. Each CIE and SIP has a clearly defined owner responsible for resolving the incident according to the defined policies.

In addition to documenting the incident and applying standard solutions, CIE and SIP ticket classification further defines the incident's importance and urgency. There are three elements involved in incident classification:

- Scope: How many customers are affected? Incident tickets are classified as Key Account Customer, Individual Data Center, Individual Regional/City Location or Global;
- Severity: How strongly affected those within the incident scope are, with emphasis given to actual incidents over changes made to working networks and services? Severity levels include Loss of Service, Intermittent or Degraded Service, Moderate Service Impact, Change to Service and No Impact; and
- Service: What is the actual service impacted? Services may include network or infrastructure devices, data centers, firewalls, network connectivity, DNS, Exchange Email, and/or web-based activities such as www.cloud.ibm.com.

Once a CIE or SIP is created, assigned, and classified, the ticket is worked until a resolution is achieved. Incident escalation occurs as necessary at the end of each NRE or SOC shift and when incidents exceed the skill set of the CIE/SIP ticket owner. Internal communications are distributed, when required, by the NRE or SOC for changes that affect system security and availability. Communication of issues or changes affecting security and availability for users are distributed as needed through the Customer Portal.

Closing a CIE/SIP ticket indicates that the incident has been resolved. The following conditions are confirmed by the CIE/SIP owner before a ticket is closed and an issue is deemed resolved:

- Telecom tickets resulting from an outage are confirmed closed with the provider.
- If possible, the problem owner demonstrates and documents in the ticket that the symptoms of the problem can no longer be reproduced.
- The problem owner confirms with an affected party that the problem is resolved. For example, when an NRE technician closes a ticket, a note is placed in the ticket indicating the specific root cause of the outage and the specific action taken to resolve the root cause. In cases that involve a failure in IBM Cloud IaaS's equipment, the NRE Technician also indicates what actions were applied to prevent future failure. This information is used if a Post-incident Review (PIR) is performed.

When a CIE or SIP ticket is recorded, IBM Cloud IaaS notifies and escalates the issue to the relevant affected customers and internal stakeholders, convenes technical and management conference bridges, and brings the appropriate technical skills to bear to resolve the incident.

Customer Initiated Incident Reporting

The incident management process defines the requirements for responding to customer raised incidents within the required response timeframe, per the defined policy. Customers initiate incident tickets via the Customer Portal. IBM Cloud IaaS personnel record each incident in an IMS ticket and track the incident from identification to resolution.

Additionally, an external facing resource is available on the IBM Cloud IaaS website for reporting vulnerabilities, risks or incidents by external parties. Issues reported are routed to the Abuse team and analyzed. Abuse or SIP tickets are created as required and monitored to resolution.

Security Incident Management

IBM Cloud IaaS security incidents are handled in accordance with IBM Cloud IaaS's incident response procedures, taking into account any data breach notification requirements under applicable law. IBM Cloud IaaS personnel have the ability to report security incidents via the IBM Cloud IaaS Help Desk. If the IBM Cloud IaaS SOC team identifies that a Customer Impacting Event (CIE) in ServiceNow or Security Incident in Progress (SIP) in JIRA has an IBM-wide/Corporate impact they will create a Resilient ticket for IBM's Computer Security Incident Response Team (CSIRT) to address. Additionally, IBM Cloud IaaS customers can report security incidents directly through their project executives or engagement team, who then communicates them to IBM's CSIRT Team via the IBM Help Desk. Incidents are rated based on severity level (severity levels 1-4). When IBM CSIRT receives a report of a potential security incident from a third party, IBM CSIRT logs the issue with the supporting details in Resilient and provides the tracking number to the party who reported the incident. Security incidents that have either already occurred or are identified in progress are logged with IBM CSIRT. Upon receiving notification of a security incident, the IBM CSIRT team takes ownership of

investigating and resolving the reported security incident, with no further action required of the service offering unless otherwise instructed by the CSIRT team.

System Capacity Monitoring

Capacity monitoring systems are managed by the NRE to monitor availability thresholds over the IBM Cloud IaaS network. Network capacity is continuously monitored, 24x7. Low capacity thresholds are defined within the availability policy and upon breach of such thresholds, alerts are automatically reported to a central mailbox that is monitored by the NRE, network capacity, and network engineering teams. Upon receiving notification of a capacity breach, the NRE team raises a JIRA ticket to record, track and resolve the capacity breach. Capacity breaches are remediated in accordance with the requirements outlined in the defined availability policy.

Redundant network infrastructure devices for the routing of critical functions exist at each data center. IBM Cloud IaaS maintains critical network devices in pairs to provide redundancy and the devices are both maintained as active. Both devices in a pair have traffic and activity processed through the devices and are monitored to ensure that the devices do not reach greater than 70% utilization. If one of the devices in a pair becomes unavailable, the standing device would be able to handle the network traffic. Capacity monitoring reports are generated and reviewed on weekly basis. The reports are used to review the utilization and check for devices that surpass the 70% utilization threshold. IBM Cloud IaaS reviews and implements appropriate strategies to reduce the utilization to an acceptable level.

Change Management

The overall change management process addresses implementations that may potentially impact the environment and includes changes to infrastructure and systems. The change management process does not include changes to customer's virtual servers, bare metal servers or customer managed network devices.

IBM Cloud IaaS is responsible for implementing changes in the IT environment including changes to individual components (e.g., equipment, systems software and applications software, procedures and environmental facilities) and coordination of changes across components (collectively, "Change Management").

To minimize the likelihood of disruption, unauthorized alterations and errors, control over the IT process of managing changes is facilitated by a management system that provides for analysis, implementation, and follow-up of changes requested and made to the existing IT infrastructure. Existing controls take into consideration the identification, and prioritization of changes, emergency procedures, impact assessment, and change authorization.

Changes to IMS and IMS Infrastructure Devices

Changes are subject to approval and testing prior to implementation. Both disruptive and non-disruptive changes require a formal change record, which is managed via the JIRA tool. Testing and back out plans are required for the majority of changes depending on the change type. Certain change types do not require testing or back out plans as testing may not be feasible or relevant. For change types that are subject to testing, each change passes through the dev/staging environment for testing and will not progress to production deployment until testing is approved. Where applicable, back out plans are documented within the JIRA record.

Changes in JIRA are assigned through an automated workflow that prevents the change from progressing until each required step is completed. Depending on the change type and impacted environment, the number and level of required reviewers and approvers may differ. Changes to the infrastructure that do not have an impact on customer service do not require approval.

Change windows/maintenance schedules are distributed via notifications in the Customer Portal to notify users of upcoming changes and outages. For individual changes that may impact/disrupt the production environment, JIRA ticket owners prepare customer facing statements that are communicated to the NOC for distribution.

Changes to Network Devices

Changes to the network are made through the console by Network Engineers or via IMS automation. Changes made through IMS tend to be common updates, such as VLAN or subnet modifications.

Console based changes are performed by Network Engineers for non-routine maintenance, configuration, and upgrades. The configurations of these devices are controlled by the Network Engineering Group. Console based changes are documented using Maintenance Operation Protocol (MOP) documents, that include the requested change and the configuration modifications. Changes to the device are made programmatically and change control is monitored by review of the Terminal Access Controller Access Control System (TACACS) log files, a remote authentication protocol.

Depending on the risk and impact of the console-based change, the change management process may vary. Prior to console changes being pushed to production, testing of network changes is performed in a virtual lab environment. Significant network changes are approved before implementation to the production environment. Console based changes are logged via the respective device's logging functionality. Configuration changes are tracked via a Git repository with a versioning history to allow simple views into the changes that were made and back-out, if necessary. Emergency changes for network devices follow a similar process as standard network changes discussed above; the changes are documented, logged, and approved.

When required, maintenance window notifications are distributed internally and to customers regarding an outage and potential for disruption. The network engineer assigned to the project or issue determines the necessity for a notification based on the risk to the security and/or availability of the network device and/or the overall network. Customers are notified of widespread service disruptions through the Customer Portal via notification banners.

Computer Operations

Computer operations procedures have been defined and documented. Employees are periodically monitored for adherence to the policy and to facilitate any required amendments or changes to procedures.

IMS Replication and Failover

IMS data is replicated to another geographically separate server to help ensure availability of the Customer Portal (IMS) and certain support services. The Customer Portal and internal IMS functionality is provided via the IMS database. This database uses live replication over a dedicated connection between two geographically redundant sites. In case of a disruption at one site, the other site continues uninterrupted functionality. The IBM Cloud IaaS data engineering team monitors the replication continuously reviewing the GoldenGate replication settings to validate replication is continuously running successfully.

In the event that IMS or the Customer Portal is unavailable, customer systems will be unaffected and continue to operate. Users can continue to operate their existing servers in lieu of the unavailable services. However, the features of IMS and the Customer Portal would be unavailable, such as the ability to view information or provision additional server instances.

On an annual basis, IBM Cloud IaaS performs a failover test of IMS from the primary location to the secondary location to verify that IMS would still operate in the event the primary site failed. Any necessary remediation over the replication settings is made based on the result of the failover test.

Backing up hosted bare metal and virtual servers and performing restore tests on a periodic basis is not included within the boundaries of the system or the scope of this report.

Disaster Recovery

Based on the configuration of IBM Cloud IaaS's "Network-Within-A-Network", with 3 network interfaces, if an outage occurs at a data center on the public network, the traffic will be routed and can traverse through the other established networks to provide continued availability of the server, by routing traffic to another data center and then utilizing the other networks to reach the server.

Also, based on IBM Cloud IaaS's design of the environment, IMS is connected to the customers' bare metal and virtual servers. However, any IMS outage that may occur will not have an impact on the customers' environments. IMS is set up separately from the customers' environments, such that public and private traffic will continue to route if IMS becomes unavailable.

A Disaster Recovery Plan (DRP) has been designed to be used in the event of a disaster affecting IBM Cloud IaaS. A disaster can result from a number of accidental, malicious or environmental events such as fire, flood, terrorist attack, human error, and software or hardware failures. The DRP provides for the identification and response to threats, notification and intercommunication for data center employees and management, procedures to follow during a disaster, damage assessment, and team member roles and responsibilities. The risk assessment includes risks that could impact availability and noted mitigations. The DRP is reviewed at least annually and changes to the procedures are approved.

The decision to initiate disaster recovery procedures will be taken by executive management after assessing the situation following a disaster or crisis. If management decides to initiate IBM Cloud IaaS's disaster recovery procedures, members of the recovery teams are required to follow the procedures contained within the DRP until recovery is complete. A hot-site facility is maintained by IBM Cloud IaaS to help mitigate the risk of downtime.

Specific goals of the plan include, but are not limited to, the following:

- To be operational at the standby facility, as soon as possible, after DR Plan invocation
- To operate at the standby facility until cutback is possible
- To minimize the disruption to core functionality

Two recovery scenarios are developed based on the severity of the damage incurred, minor damage affecting part of the environment or major damage affecting the entire or majority of the environment.

During a recovery, certain teams are deployed including an Operations Team, Network Operations and Engineering Teams, Facilities Teams, and Communications Teams, each with specific responsibilities including the following:

Operations Teams	Network Operations and Engineering Teams	Facilities Teams	Communications Teams

• Ensuring that the standby equipment meets the recovery schedules.
• Providing the appropriate management and staffing of the standby data center, data control, and help desk in order to meet the defined level of user requirements.
• Working with the Network Team to restore local and wide area data communications services to meet the minimum processing requirements.
• Initiating operations at the standby facility.
• Providing sufficient personnel to support operations at the standby facility.
• Managing the standby facilities to meet users' requirements.
• Establishing processing schedule and inform user contacts.
• Arranging for acquisition and/or availability of necessary computer supplies.
• Ensuring that documentation for standards, operations, vital records maintenance, application programs etc. are stored in a secure/safe environment and reassembled at the standby facilities, as appropriate.
	• Evaluating the extent of damage to the voice and data network and discuss alternate communications arrangements with telecoms service providers.
	• Establishing the network at the standby facilities in order to bring up the required operations.
	• Defining the priorities for restoring the network in the user areas.
	• Ordering the voice/data communications and equipment as required.
	• Supervising the line and equipment installation for the new network.
	• Providing necessary network documentation.
	• Providing ongoing support of the networks at the standby facility.
	• Reestablishing the networks at the primary site when the post disaster restoration is complete.
		• In conjunction with the Information Systems, evaluating the damage and identifying equipment that can be salvaged.
		• Working with the Networking Team to have lines ready for rapid activation.
		• As soon as the standby site is occupied, cleaning up the disaster site and securing that site to prevent further damage.
		• Supplying information for initiating insurance claims. Ensuring that insurance arrangements are appropriate for the prevailing circumstances (i.e., any replacement equipment is immediately covered etc.).
		• Preparing the original data center for re-occupation.
		• Maintaining current configuration schematics of the Data Center (stored off site) This should include:
		  ○ Air conditioning,
		  ○ Power distribution,
		  ○ Electrical supplies and connections,
		  ○ Specifications and floor layouts,
		  ○ Controlling security within the disaster area,
		  ○ Arranging for necessary office support services, and
		  ○ Managing staff safety and welfare.
			• Working with Management to obtain directives on the messages to communicate.
			• Making statements to local, national and international media, as appropriate.
			• Informing suppliers and customers of any potential delays.
			• Informing employees of the recovery progress of the schedules.
			• Ensuring that there are no miscommunications that could damage the image of the company.
			• Any other public relations.

People

Organization and Administration

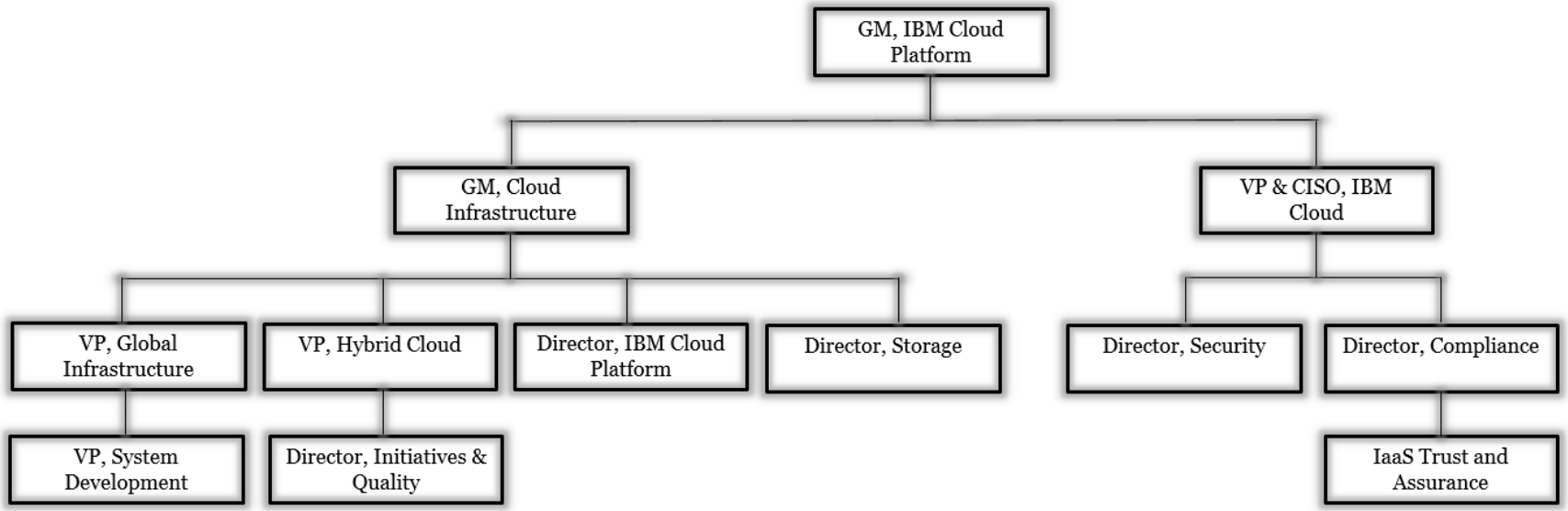
Key IBM Cloud IaaS positions of authority and responsibility are documented in a formal organizational chart via IBM's BluePages, which evidences key organizational structures and reporting lines. The organizational chart is reviewed by HR and updated periodically for accuracy by managers.

Within the organization, roles and responsibilities are defined and communicated. IBM Cloud IaaS leverages participation from multiple organizational levels, sites, locations, geographies and organizations are involved, as required, to perform the day-to-day oversight of service delivery related functions, matters, responsibilities and issues. Functional roles may be combined within management positions to deliver services in a cost-effective manner.

The IBM Cloud IaaS teams are diverse teams of development and operations professionals, which maintain and follow IBM's industry leading processes, standards and procedures in the execution of their work. Security and availability requirements are generated from senior management. These requirements are distributed to the operational management leaders. These leaders are responsible for the implementation and monitoring of security controls.

The General Manager of IBM Cloud Infrastructure Services oversees daily operations and reports to the IBM Public Cloud GM, IBM Cloud Platform. Supporting the GM are Tribe Leaders, Directors and Vice Presidents that manage and perform the daily operations of IBM Cloud IaaS. These core competencies have been established to provide full capabilities to serve customers worldwide. Functional and administrative responsibilities are broadly defined and communicated through organizational charts, which are reviewed and updated regularly.

IBM Cloud IaaS Organizational Chart as of October 31, 2019



Human Resources (HR)

IBM's personnel policies and procedures are designed to recruit, develop, and retain competent and trustworthy employees who facilitate an effective internal control system. IBM has a long-standing commitment to equal opportunity due to its recognition that a diverse workforce is fundamental to its competitive success. IBM's documented Workforce Diversity Policy requires that activities such as hiring, promotion, and compensation be conducted without regard to race, color, religion, gender, gender identity or expression, sexual orientation, national origin, genetics, disability, or age. Furthermore, IBM policy states that the workplace environment is to be free of harassment and reasonable workplace accommodations are to be made for the disabled, in accordance with applicable laws.

- Recruiting Employees and Engaging Contractors: IBM has a set of centralized HR policies and procedures for recruiting, developing, retaining and compensating employees. IBM selects appropriately qualified applicants based on business needs, job-related requirements as per stated job descriptions/positions, and assessment of each applicant's individual qualifications and skills.
- New Hire Orientation: As part of the on-boarding process, new hires attend an induction session (Start at IBM) that gives them an understanding of IBM's culture, its values, the organization, and what it means to be an IBMer. The session also covers the importance of the professional career and the tools and resources that are available to all employees.

- Talent Development and Training: IBM identifies and focuses employee development on skills that are the most relevant in the industries it serves so that employees can have insight into the skills most valued by the market and IBM. Employees are actively encouraged to gain skills of the future to quickly grow and advance. Skills requirements are constantly changing due to disruptive technologies and new business models. As a result, rapid enablement through the latest digital learning is valued. Besides skills development through an array of educational and training opportunities including traditional classroom, mentoring, coaching and community learning, IBM Learning offers rapid enablement through short "bite-sized" digital learning. Your Learning provides employees with a centralized digital learning platform by aggregating learning from across multiple internal and external sources. The platform provides personalized learning recommendations based on the learner's profile and learning transcript history, while at the same time allowing them to customize the space by choosing what learning is most relevant for their performance, development needs and continuous career building.
- Performance Based Compensation: Checkpoint is IBM's performance management process for promoting a high-performance culture that is built on clear strategy and priorities and fueled by feedback. The program is based on three (3) key actions: Create Goals, Exchange of Feedback, and Annual Assessment. Employees create goals reflecting their work, business direction and the five (5) dimensions (Business Results, Client Success, Innovation, Responsibility to Others, and Skills), which are built on the foundation of IBM's Values and Practices. Goals are updated and managers meet with their employees throughout the year to align goals with business priorities, discuss progress, and provide feedback to ensure employees understand how to elevate their performance and deliver results. Managers perform a year-end assessment using a three-point rating scale for each dimension (Exceeds, Achieves, Expects More) based on expectations for the role and band.

Background Due Diligence (Verification)

IBM's hiring practices mandate minimum criteria that each potential candidate must meet. A key component of IBM's hiring process is an established set of Global Employment Verification (GEVS) criteria applicable to regulars, non-regulars (fixed term, supplemental), and interns/students. A reduced set of criteria is applicable to transitioning employees from acquisitions and outsourcing deals.

The following verification criteria are mandatory for candidates being considered for IBM employment:

- Hiring government employees
- Restricted and Sensitive Hiring List
- Re-hire eligibility
- Non-Compete clause
- Denied Parties List
- Export Controls Regulation Review
- Criminal background check
- Work authorization/residence permit
- Proof of identity

- Confirmation of academic achievement for Early Professional Hires

There may be specific country-level verification and exception criteria that must also be assessed based on local statutory requirements, inherent country risk factors, industry practices or known contractual requirements.

Contractors: Similar to background checks for IBM employees, suppliers that provide contract personnel are required by procurement contract terms to perform background checks prior to providing the contractor to IBM.

Codes of Conduct

IBM's Business Conduct Guidelines (BCG) define the standards of acceptable business conduct for all IBM employees worldwide, including but not limited to topics such as: anti-bribery, gifts and amenities, competition, conflict of interest, intellectual property, books and records, working with third parties, etc. IBM regularly reviews and updates the BCG content, as needed, in order to comply with IBM policies, laws, regulations and external guidance. Employees certify that they have read and will comply with the IBM BCG as new employees and re-certify annually thereafter. The certification process, including completion of a BCG education course, is tracked by the IBM legal department and the employee's manager.

IBM uses the Responsible Business Alliance (RBA), formerly known as Electronic Industry Citizenship Coalition (EICC), code of conduct that establishes the minimum social responsibility standards expected from procurement suppliers as conditions for doing business with IBM. During 2018, IBM migrated its numerous internal policies and practices as well as external EICC references to RBA, including updating IBM Global Procurement Policies and Practices. The RBA code establishes standards that creates an environment where working conditions are safe, that workers are treated with respect and dignity, and that business operations are environmentally responsible and conducted ethically.

IBM requires all suppliers to sign an RBA Letter Agreement demonstrating their commitment to adhere to the RBA Code.

Reporting Channels and Investigations

IBM's Concerns and Appeals Programs enable employees to bring forward any company-related concerns to management's attention in order to have the employee's point of view about a policy or practice considered, initiate an investigation of possible wrongdoing or inappropriate behavior, identify a broken process or unnecessary bureaucracy, or appeal a management decision personally affecting the employee. The programs include Confidentially Speaking and Open Door.

In 2018 IBM rolled out the "Talk It Over@IBM" channel to provide guidance to IBM employees as part of HR Corporate Guidance "Preventing harassment & bullying in the workplace and avoiding conflicts of interest arising from romantic & familial relationships". The channel allows employees to connect with global experienced HR professionals who will listen, and offer guidance on the available options, to help IBMers decide what, if any, actions they wish to take. IBM's Concerns and Appeals channel remains the mechanism for IBMers to submit a complaint or grievance for investigation.

Confidentially Speaking which forms part of the overall Concerns and Appeals Program enables every IBM employee to express their concerns, whether related to IBM Policy and practices, internal process issues relating to their own job (i.e. benefits, careers, safety) or to an alleged violation

of IBM's BCG (i.e. allegations of fraud, theft, improper business practices, management circumvention or override of controls), or other ethical issues. Employees have the option to report anonymously.

Open Door is designed to investigate specific issues or management decisions that affect the employee personally, such as a compensation decision, unfair treatment or dismissal.

Internal Audit (IA) investigates alleged BCG violations related to financial recording and reporting, business processes and inappropriate use of assets. Allegations can be submitted by line management, employees, Legal, Security, HR and IA to the appropriate geography investigations manager. Additional allegation sources can include anonymous letters, complaints by customers, business partners, suppliers, former employees and referrals from the Concerns and Appeals administrators received via the Confidentially Speaking reporting channel.

The geography investigations manager submits allegations for review to the Allegation Review Board (ARB), which is composed of IA, HR and Legal. The ARB is responsible for reviewing each allegation it receives to determine the appropriate course of action:

If an investigation identifies a financial statement impact or involves matters of a sensitive nature, the resulting disciplinary action recommendation must also be reviewed by a CHQ panel whose members include: the VP of HR, Employee Relations and Engagement; the General Auditor; and the VP and Controller.

On a quarterly basis, as part of IA's centralized investigations program, the Audit Committee is provided a report detailing the nature, status and disposition of substantiated IA investigations that have a financial statement impact.

Procedures

Customers are provided and required to agree to a Cloud Service Agreement (CSA) when signing up for an IBM Cloud account. The CSA acts as the formal contract and usage policy for customer users of the IBM Cloud IaaS system. The CSA documents the contractual obligations of IBM Cloud IaaS and the customers using IBM Cloud IaaS. Any updates to the CSA are communicated to the existing customers through email.

The policies and procedures are a series of documents, which are used to describe the controls implemented within the IBM Cloud IaaS system. The purpose of the policies and procedures is to describe the environment and define the practices performed on behalf of the customer. The policies and procedures include diagrams and descriptions of the network, infrastructure, environment and IBM Cloud IaaS's commitments. These policies and procedures are available to IBM Cloud IaaS employees that support the IBM Cloud IaaS system. Additionally, each of the policies and procedures are reviewed by IBM Cloud IaaS management on a periodic basis, per the defined policy.

HR Policies and Procedures

IBM has a set of centralized HR policies and procedures for recruiting, developing, retaining and compensating personnel. IBM's documented Workforce Diversity Policy requires that activities such as hiring, promotion, and compensation be conducted without regard to race, color, religion, gender, gender identity or expression, sexual orientation, national origin, genetics, disability, or age. Furthermore, IBM policy states that the workplace environment is free of harassment and affords reasonable accommodation for the disabled, in accordance with applicable laws.

Information Management Policies and Procedures

Information Management describes the programs, architecture framework, standards, and guidelines the IBM Chief Information Officer (CIO), Chief Data Officer (CDO) and Chief Information Security Officer (CISO) organizations have designed to achieve effective management of data as a corporation-wide asset that meets the needs of their external and internal customers. Policies governing customers are defined by each service offering management team and reviewed at least annually.

IBM Cloud IaaS's IT security and availability requirements are intended to mitigate risk, to minimize or eliminate the loss or misuse of information critical to IBM's business, and to prevent the disruption of IBM's business operations due to unauthorized or excessive access to IBM Cloud IaaS's information technology services and assets. Information security and availability is managed through the following:

- Workstation Security: IBM has a policy governing workstation security compliance. IBM workstations employ diagnostic tools that check for core workstation security features which automatically correct issues or notify employees of non-compliance to drive manual corrections. These checks include: hard drive security (password protection or full disk encryption); screen saver; antivirus; firewall; database encryption, if required based on data sensitivity; user account passwords; service pack level and security patch currency; as well as verification that certain features are not enabled such as file-sharing capabilities.
- Data Privacy: Corporate policies and guidelines for collecting, using, disclosing, storing, accessing, transferring or otherwise processing of personal information are in place, allowing IBM to process information as necessary in executing a particular business purpose.
- Physical Security: Policies and procedures for managing physical access to IBM Cloud IaaS facilities, including user ID management and restricted access through the use of a badge access system.
- Logical Security: Policies and procedures for managing logical access to systems and devices, including user ID management and vulnerability scanning.
- Network Security: Policies and procedures for managing and monitoring IMS network security, including firewall rule revalidations, network penetration testing, intrusion detection/prevention (IDS/IPS) monitoring, and secure transmission of information and data through secure file transfer protocol (FTP). IBM Cloud IaaS implements these mechanisms for its internal assets and resources. IBM Cloud IaaS offers a catalogue of these tools to customers but maintains no responsibility for configuration and implementation of customer's security tools is not within the boundaries of the system.
- Incident and Security Incident Management: Policies and procedures for incident and security incident management, including both internally and externally reported problems and security incidents.
- Change Management: Policies and procedures for managing changes to system software and network components, including change approvals, testing and affected user communications.
- System Availability: Policies and procedures for managing system availability, including monitoring of system capacity, backing up of critical data, data restoration testing, management of environmental controls at data centers, and management and testing of the business continuity and disaster recovery plans (BCP and DRP).

IT Risk Assessment Process

IBM Cloud IaaS's risk assessment process consists of the following elements:

- Determining business objectives including security commitments
- Evaluating the effect of internal and external factors related to the environmental, regulatory, and technological changes on IBM's system security
- Identifying threats to operations, including security threats, using information technology asset records
- Analyzing risks associated with the threats
- Determining a risk mitigation strategy that contemplates the risk of fraud, including the incentives, opportunities, and potential rationalizations
- Developing or modifying and deploying controls consistent with the risk mitigation strategy

IBM Cloud IaaS maintains a Risk Assessment Policy, which documents the Risk Management Life Cycle (RMLC) that IBM Cloud IaaS follows to identify, assess, mitigate, and monitor risk for its IaaS. The RMLC consists of a Risk Assessment that includes Risk Acceptance Criteria, Risk Treatment, and Reporting and Monitoring.

On an annual basis, the VP of Risk Management coordinates the RMLC. Designated Risk Assessors complete the Risk Assessment by documenting assets (documents, applications, databases, people, equipment, infrastructure, external services, etc.) and their associated threats and vulnerabilities. Asset owners are responsible for alerting the Trust and Assurance team to any identified risks during the course of operation. Each asset is assigned a score based on the criteria of consequence severity and probability of the risk occurring. Based on the final score, each associated risk is determined to be either acceptable or unacceptable. Unacceptable risks go through the Risk Treatment process to identify options to either transfer or avoid the risk. If neither option is feasible, a Risk Acceptance is documented.

All existing Risk Acceptances are reviewed on an annual basis to determine if the risk can be mitigated. The Risk Assessors are responsible for monitoring the progress of implementation against the Risk Treatment plan and reporting the results to the VP of Risk Management. The Risk Assessment does not extend to routine development initiatives classified as standard or custodial that maintain the Company's operations.

Vendor Risk Assessment and Management Process

Contracts with vendors and business partners must be documented via formal legal agreements between IBM Cloud IaaS and the service provider. Management deems vendors and business partners as in scope for this report based upon their involvement within the control activities covered in the SOC reporting environment. The vendors in the scope of this report include the data center facility providers for the in scope physical locations. IBM Cloud IaaS contracts with a variety of data center vendors to provide the physical data center sites where hardware is located.

As IBM Cloud IaaS retains ownership of the physical and environmental controls within the scope of this report through monitoring each physical environment and the actions of each facilities management vendor, the vendors are not considered subservice organizations necessary, within the

boundaries of the IBM Cloud IaaS system, to achieve service commitments and system requirements based on the applicable trust services criteria. IBM Cloud IaaS employed site managers are assigned for in-scope data centers. The facility management vendors are in continuous contact with the IBM Cloud IaaS Site Managers through the real estate managers and facility engineers communicating via the Portal and e-mail notifications.

Management Monitoring of Controls

IBM's Framework of Internal Control (FIC) is based on the 2013 COSO (Committee of Sponsoring Organizations of the Treadway Commission) Framework which is comprised of Entity Level Controls (ELCs) that are enterprise wide and have a pervasive effect toward the achievement of IBM's operating, reporting, and compliance objectives while guarding against inherent risks.

Examples of ELCs are Board of Directors, Codes of Conduct, Background Due Diligence, HR Policies to Recruit, Develop, & Compensate, Reporting Channels & Investigations, Management Self-Assessment of Control, and Internal Audit.

IBM's ELCs have been mapped to components and principles of COSO 2013. Each of the components and principles are required to be present and functioning and operating together in an integrated manner.

Board of Directors (Executive Management Oversight)

IBM's Board of Directors is responsible for the supervision of the overall affairs of the Company. The Board holds periodic meetings during the year. The Board adheres to governance principles, as specified in a set of Corporate Governance Guidelines. Board members are selected based on their business or professional experience, the diversity of their background, and their array of talents and perspectives. The Board is composed of a majority of independent members who are elected by the company's shareholders. The Board has delegated certain authority to three key committees: (1) Audit Committee, (2) Directors and Corporate Governance Committee, (3) Executive Compensation and Management Resources Committee, which are composed entirely of independent directors. Each committee has a written charter and reports regularly to the Board.

IBM's Audit Committee are non-management directors who satisfy the independence criteria established by the Board and the standards of the Securities and Exchange Commission and New York Stock Exchange. The committee assists the Board with oversight of the integrity of the Company's financial statements, compliance with legal and regulatory requirements, the independent accountant's qualifications and independence, and the performance of the internal audit function and IBM's independent accountant. The Committee reviews the implementation of IBM's Business Conduct Guidelines and the process to monitor compliance through education and employee certification. On a quarterly basis, as part of Internal Audit's (IA) centralized investigations program, the Audit Committee is provided a report detailing the nature, status and disposition of substantiated IA investigations that have a financial statement impact.

Management Self-Assessment of Control

IBM Cloud IaaS's Management Self-Assessment of Control (MSAC) is a formal and comprehensive approach to identify, monitor and manage potential control risk. As part of the control assessment, management validates the design and effectiveness of internal controls, promoting early identification of emerging or changing risks.

Internal Audit

IBM's Internal Audit (IA) organization's authority to assess the control posture of the IBM Corporation is formally established in a corporate directive. IBM's senior management and the Audit Committee support IA's mission by enabling the organization to be adequately staffed with the appropriate skills and audit engagements to be performed on an independent basis. Independence is addressed through its reporting structure. The General Auditor reports administratively to the CFO but is accountable to the Audit Committee.

IA uses a planning methodology comprised of both a risk model which includes fraud risk considerations and a coverage operating model resulting in an annual plan which is a prioritization of a well-defined audit universe. IA monitors and tracks line management's implementation of recommendations to address audit concerns (findings) until closure. Internal Audit does not generally audit controls and procedures related to the user organization's (client) business processes.

In 2018, Risk Taxonomy was developed and deployed with input from all three lines of defense – 1) the Global Process Owners, 2) Business Controls / Enterprise Risk Management, and 3) Internal Audit. The taxonomy, which is managed and maintained by Internal Audit, identifies risk areas for IBM's business processes and assigns high / medium / low risk levels for each risk area. The Audit Programs have been updated to align with the risk areas defined during the taxonomy work.

Internal audit conducts an extensive training and education program to develop and maintain audit skills.

Trust and Assurance Team

The Trust and Assurance team is a part of IBM Public Cloud Security & Compliance and supports the IBM Cloud IaaS-wide compliance efforts by monitoring compliance and conducting communication, training and awareness initiatives in response to contractual and regulatory requirements. The Trust and Assurance team develops and maintains IBM Cloud IaaS-wide policies and makes them available to IBM Cloud IaaS personnel. Additionally, the Trust and Assurance team monitors non-compliance issues and remediation efforts to ensure issues are resolved according to an approved plan.

Controls

IBM Cloud IaaS has adopted the Key Controls over Operations (KCO) methodology in order to improve the effectiveness of IBM Cloud IaaS's control system through standardization and identification of common key control points with established testing criteria. This process utilizes established frequency and sample size requirements for the testing of each control point. This was adopted to streamline and improve the efficiency of IBM Cloud IaaS's control system and to model the Sarbanes Oxley approach for key operational controls for IBM Cloud IaaS.

Results of the KCO testing are reported to IBM Cloud IaaS management and entered into the Worldwide Controls Database managed by IBM Corporate Headquarters. The controllable units tested receive a report of findings from the KCO testing and are responsible for developing and implementing an action plan to address the findings.

Data

The integrity and conformity with regulatory requirements of workloads sent to the IBM Cloud IaaS system are solely the responsibility of IBM Cloud IaaS customers. IBM Cloud IaaS does not maintain responsibility for the data IBM Cloud IaaS customers store on their bare metal, virtual, or hybrid environment. The data is the responsibility of IBM Cloud IaaS customers.