Robust Design of MiCloud Connect

Description: This Application Note describes the design of the MiCloud Connect Unified Communications system.

Environment: Mitel MiCloud Connect

With the market moving applications to the cloud, unified communications (UC) customers are looking to enjoy the benefits that hosted systems deliver, but sometimes question their reliability. It's mandatory that the Unified Communication as a Service (UCaaS) provider ensure that, in addition to the cloud solution meeting the business needs of the user, the infrastructure supporting the cloud solution must be at least as reliable and robust as any premises-based solution can be.

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Maximizing Dependability

In the case of normal operations, state-of-the-art network design at all layers of the solution provides for robust and resilient day-to-day operations. When speaking of "Layers of Service," we're referring to the layers of the multi-layered solution; in this case, Mitel Connect CLOUD. The layers are as follows:

Mitel Connect CLOUD was designed specifically to both meet the needs of the most demanding customers, and for maximum operational uptime, using state-of-the -art components and strategies in its TIA 942 Class 4 data center and at its hardware, solution and application layers.

Detailed explanations of each layer are provided below, starting at the bottom layer of data centers and working upward. Please refer to the chart above as you read through each explanation.

Data Centers

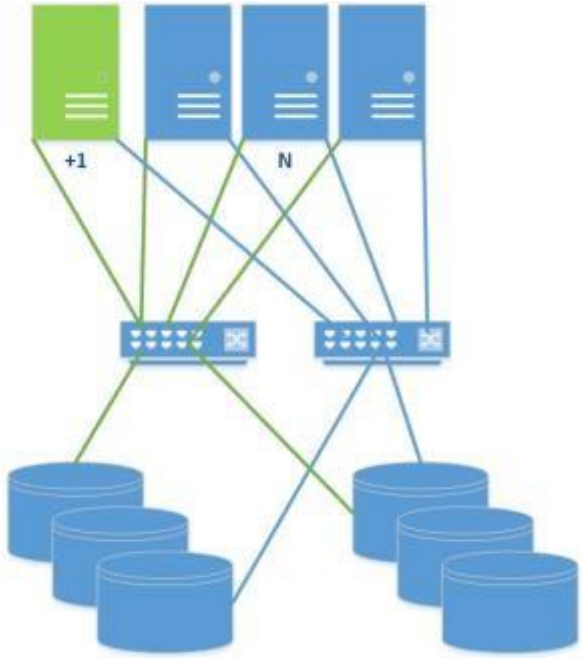
The ANSI-certified Telecommunications Industry Association (TIA) classifies data centers by class. With expected fault-tolerant site availability of 99.995%, all Mitel cloud data centers are classified **TIA942 Class 4** and are designed to provide the utmost in uptime performance and redundancy for UCaaS and other similarly hosted solutions.

In addition to meeting or exceeding the Class 4 requirements, all Referring to the chart above, all Mitel data centers have multiple, independent network paths serving both telephony and data networks. These redundant data paths are maintained by multiple network providers and each path enters the building in different physical locations. All AC power is sourced from independent, redundant power grids with multiple, independent power sources also entering the building in different physical locations. Also, all HVAC systems are independently powered from multiple sources, again, with multiple, independent paths. Additionally, Mitel operates two Network

Operations Centers (NOCs) to monitor and control the daily operations of all Connect CLOUD systems. These NOCs are staffed 24 hours / 7 days a week by Mitel engineers who monitor normal daily operations or, in the case of an emergency, ensure that automatic failover procedures are followed and that successful failovers occur.

Network and Hosts

Above the data center layer, the hosts and network serve in unison to provide computing power for the UC system. Mitel Connect CLOUD is designed for and supported by a multi-chassis server hardware infrastructure. These systems, including the session border controllers (SBCs) powering Mitel Connect CLOUD are multi-path and N+1 redundant at all layers, meaning that all paths of power, data and networking are redundant and the chassis/hosts supporting the infrastructure are designed with an N+1 model; that is, there are (N) server chassis with 1 (+1) spare that will automatically “fail over” should an issue with a host chassis occur.



N+1 Redundancy

At the network level, similar N+1 design provides for multiple network interfaces to connect with multiple redundant network switches to multiple networks for a completely redundant path should any single component or system fail. Of course, all power to these "outside the host" networking systems is redundant. All of these systems are again, N+1.

Storage and Data

Mitel Connect CLOUD is a very data-driven solution and as such, is designed with a very conservative approach to storing and accessing data. Data is stored on highly redundant, 10Gb/sec Storage Area Network connected disk storage systems in geographically redundant data centers.

These storage systems are tolerant of multiple disk failures and multiple core-component failures.

During normal daily operations, the system conducts back-ups to both local and geographically redundant data centers multiple times per hour. The components and networks in the data path for both local and remote backups are redundant.

In the case of system maintenance, system snapshots and back-ups are conducted and verified before all system level software is modified or upgraded, ensuring that if in the case of unforeseen issues, data can be restored to a previous place-in-time and the system can then re-join the virtual cluster. Further investigation on any possible issue in this situation is critical and is addressed immediately by Mitel engineering teams.

Compute Virtualization

Virtualization at its simplest level provides an abstracted or "virtual" host environment. Typically, multiple virtual machines reside and are serviced by a single physical host. This can be expanded so that many virtual machines reside on, and are serviced by, multiple physical hosts, often at ratios of up to 10, 20 or more virtual machines per physical host.

Mitel Connect CLOUD was designed for, and is maintained in a 100% virtualized environment. Virtualization provides many advantages over a traditional physical host including efficiency, flexibility and availability. Also employed are clusters or more accurately, virtual clusters. These virtual clusters provide flexible and dynamic ways to organize the aggregated resources in the virtual environment. They can act as one or many entities, but do not maintain a relationship with a host. They can and do have relationships with multiple hosts and that relationship can be dynamic.

In the case of Mitel Connect CLOUD and specifically its resiliency, virtual clusters provide a highavailability compute environment that is not tied to a specific host. The failure of a single host or virtual machine simply causes a dynamic reallocation of resources to the cluster, excluding the failed component. This failure will immediately be addressed by Mitel engineers at our NOC and corrective action will be taken all while the cluster and Mitel Connect CLOUD are still providing service. There will be no outage or downtime as the Mitel cluster is provisioned for greater capacity than typical, normal conditions. Should resources become scarce, more resources will be added to the cluster or the workload can be dynamically migrated to other available resources.

Above the Layers – Application Specific Design and Networking

Riding on top of the virtualization layer is the Connect CLOUD application. It's intelligently designed as a distributed application to run in a high-availability clustered environment where each component is distributed among one of multiple virtual machines in a virtual cluster, as discussed above. These clusters operate in an active-active configuration.

One distinct advantage to this design is the resilience that's possible. These distributed components are independent instances and can be addressed individually. Accordingly, if any one of these components fail, the Connect CLOUD Service Manager, part of the full solution that monitors

applications, provides local server recovery options such as restarting the component automatically. Furthermore, all application servers have external health monitoring to provide alerts to the NOCs so that an issue that must be addressed before something more serious occurs.

While it's very similar to other types of IT infrastructure, there are specific networking components and features unique to a UC system, most importantly, interfacing with the Public Switched Telephone Network (PSTN). Mitel Connect CLOUD benefits from the physical location of its Points of Presence (POPs) where the physical interface to these networks occurs. While others take a shotgun, ***quantity***-first approach, Mitel Connect CLOUD POPs are well established at the most connected and exclusive Carrier Hotels in the country. Residing in the same physical POP, the routes to both data and telephony carrier networks are often "one hop" away. By not relying on potentially multiple, external, 3rd party and uncontrolled routers along the path, the risk to all traffic is significantly reduced.

Furthermore, Connect CLOUD's trunk switches are the interface between Voice Over IP (VoIP) traffic and the PSTN. Multiple trunk switches at each POP maintain redundant, load balanced access to multiple carriers PSTN.

In Case of Disaster – Disaster Recovery

Disaster Recovery involves a set of policies and procedures to enable the recovery of data or continuation of operations of vital technology infrastructure and systems following a disaster. Disasters take many forms and the design of Mitel Connect CLOUD includes provisions for recovery from these types of disasters to ensure that both data and UC service are protected.

In addition to the above mentioned geographically redundant data backups, Mitel Connect CLOUD disaster recovery migrates UC service to a geographically redundant data center should a disaster occur and prevent the primary data center from servicing communications for any reason. That data center is not in the same region of the country as the failed data center, again, to mitigate risk.

Should the primary data center "fail over" to a redundant data center, all network routing changes are transparent and no further effort on the part of the user or their IT staff is necessary. The situation is immediately investigated and addressed. The design of the Connect CLOUD system ensures the continuity of its operations in the rare case of a disaster requiring recovery.

Natural and other disasters requiring geographically redundant migrations of service are very unlikely and the risk is low. Mitel further mitigates this risk both with these procedures and the design of the Connect CLOUD system to ensure operations are as constant as possible in the rare case of a disaster requiring recovery.

Conclusion

To conclude, risk is a presence in our daily lives, particularly with technology. The choice to move to a cloud-based UC solution is clearly not simple, but with a long history and experience focused on telephony and well established relationships with network carriers as well as a focus on state-of-theart high-availability design, Mitel Connect CLOUD provides a complete solution designed and built to provide the most robust and resilient end-to-end unified communications solution in the industry.

Frequently Asked Questions

What should I do if my phones are not working?

1. For the most current system condition, visit https://trust.Mitel.com and login using your Mitel Portal credentials.
2. If there is a known issue, you can view details and monitor the progress by Mitel engineers on the "System Status" tab.
3. If all services are operating normally according to trust.Mitel.com, please contact Mitel Support in the way is most convenient for you. All options are listed at http://support.Mitel.com/contact_us/.

What is Trust? https://trust.Mitel.com?

Mitel's Trust site provides customers with the most current, reliable details about service availability. After logging in using your Mitel Portal credentials, you will find details about system availability, work arounds, and other answers to your important questions. All the information a Support team member may have shared on the phone in the past is right there, on your screen, getting updated by our engineering team during a service incident.

The new Trust site is now part of Mitel's Support site. In addition to these service availability details, you can also quickly create a support ticket within the site. No more calls to Support means more time to focus on your business.

How often is Mitel's Trust site updated?
During service incidents, the Trust site is updated at least every 30 minutes or more frequently if there are updates to share with customers.

Glossary

Active-Active - Scheme where multiple components are both active in the operational environment AND act as a redundant component in case of component failure/failover.
https://en.wikipedia.org/wiki/Active_redundancy

Back-up - The copying and archiving of computer data so it may be used to *restore* the original after a data loss event.
https://en.wikipedia.org/wiki/Backup

Carrier Hotels - Data centers where data and PSTN network carriers are located.
https://en.wikipedia.org/wiki/Colocation_centre

Data Center TIA942 https://en.wikipedia.org/wiki/TIA-942

Disaster Recovery – A set of policies and procedures to enable the recovery or continuation of vital technology infrastructure and systems following a disaster.
https://en.wikipedia.org/wiki/Disaster_recovery

Distributed Architecture Computing https://en.wikipedia.org/wiki/Distributed_computing

Failover - Switching to a redundant component or system upon the failure of a previously active component or system.
https://en.wikipedia.org/wiki/Failover

Geographically Redundant - Operating at more than one location, as a form of redundancy in case one site fails.
https://en.wiktionary.org/wiki/georedundant

N+1 Redundancy - Redundancy including the nominal components (N) plus one spare (+1).
https://en.wikipedia.org/wiki/N%2B1_redundancy

High-Availability Clusters - Groups of computers that support server applications that can be reliably utilized with a minimum of down-time.
https://en.wikipedia.org/wiki/High-availability_cluster

NOC - Network Operations Center – A location from which network monitoring and control or management, is exercised over a computer or telecommunications network.
https://en.wikipedia.org/wiki/Network_operations_center

Point of Presence (POP) - An interface point between communicating entities.
https://en.wikipedia.org/wiki/Point_of_presence

PSTN – Public Switched Telephone Network
https://en.wikipedia.org/wiki/Public_switched_telephone_network

Session Border Controller (SBC) - a device to control the signaling and media streams involved in telephone calls or other interactive media communications.
https://en.wikipedia.org/wiki/**Session_border_controller**

Snapshots
https://en.wikipedia.org/wiki/Snapshot_(computer_storage)

Version	Date	Contributor	Content
1.0	November, 2017	J. Mancebo	Original App Note – Mitel Rebranded only