Dell CloudIQ provides a single console for proactive monitoring and had negligible impact on network bandwidth in our tests

Integrated management solutions that enable administrators to monitor environments from the cloud can save IT teams time and reduce the chance that they'll miss key health or performance issues. Because monitoring tools run constantly in the background, it's important to assess the amount of bandwidth CloudIQ uses to address network congestion concerns as well as the security of transmitting this data.

From the Principled Technologies data center, we set up a number of host servers (from one to three, depending on the test) and used Dell CloudIQ to monitor and report on the health and performance of our environment. With four kinds of monitoring—telemetry, health status, alerts, and inventory—we found that using the CloudIQ solution efficiently packaged and encrypted the data it sent from on-prem to the cloud, with negligible impact on network bandwidth. As the amount of data passed over the network scales with your number of host servers, CloudIQ offers vital insight and Artificial Intelligence for IT operations (AIOps) functions without impacting network performance.

0.056 KBps

average transferred over the network (with two hosts) over the one-hour test period

Low network bandwidth consumption

Monitor infrastructure from a single console

Using the CloudIQ in conjunction with Dell OpenManage™ Enterprise (OME), users can utilize a single, simple, cloud-based portal to monitor health and performance across many locations and OME instances. According to Dell, "CloudIQ combines proactive monitoring, machine learning and predictive analytics so you can take quick action and simplify operations of your on-premises infrastructure and data protection in the cloud."

"CloudIQ supports a broad range of Dell products, including: servers (PowerEdge™), storage (PowerStore, PowerMax, PowerScale, PowerVault™, Unity XT, XtremIO, and SC Series), data protection (PowerProtect DD and PowerProtect Data Manager), converged and hyperconverged infrastructure (VxBlock, VxRail™, and PowerFlex), and networking (PowerSwitch for Ethernet/Connectrix® for SAN) - plus APEX Data Storage Services."[1] Because CloudIQ is a cloud application, the list of products it supports continues to grow as product integrations and new features are released.

Figure 1 shows the System Health View in CloudIQ. This telemetry data is provided via each server's agentless iDRAC (Dell remote access controller) with zero impact to server performance and a dedicated out-of-band network port to isolate management traffic to OME. To learn more about Dell CloudIQ, visit https://www.dell.com/en-us/dt/storage/cloudiq.htm.

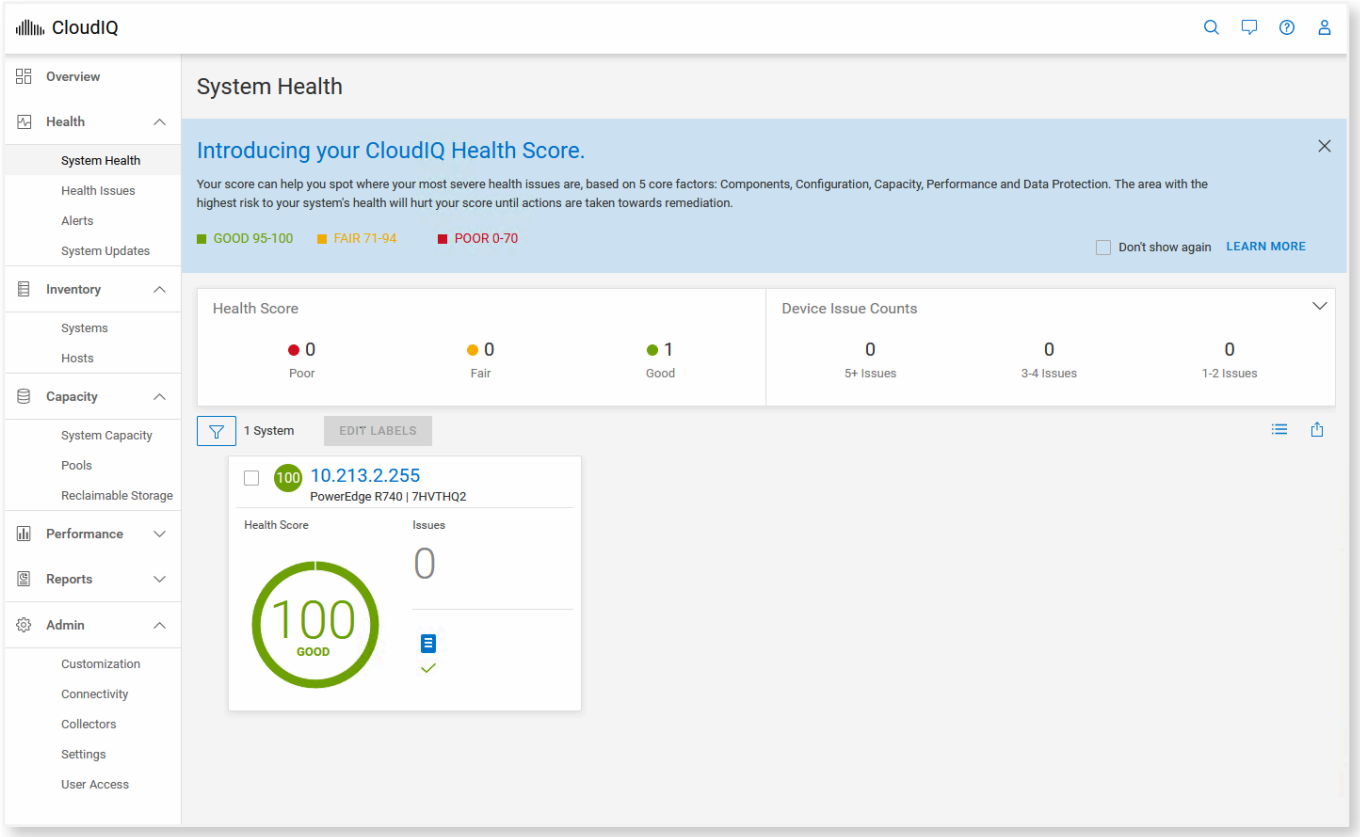

Figure 1: Screenshot of the System Health view in CloudIQ. Source: Principled Technologies.

Our testing approach

We set up our host servers under test in our data center, using Dell OME to monitor our PowerEdge servers and connect to Dell CloudIQ. We looked at four types of monitoring/alerting that send data from OME (on-prem) to CloudIQ (Dell's Private Cloud) across data centers:

1. **Metrics -** System telemetry monitoring (such as CPU and memory utilization).
2. **Health -** Regularly updated system health status.
3. **Alerts -** Notifications of hardware events as detected by iDRAC
4. **Inventory -** Detailed inventory for hardware and firmware, with automatic refresh on any changes.

The main goal of our testing was to show the impact that constant server monitoring has on network bandwidth. We also recorded telemetry, and report health status, alerting, and inventory reports to mirror a real-world environment. Note that Dell designed the solution to send no updates if there are no changes to report, which optimizes bandwidth required for the product. Therefore, the total data transmitted from OME to CloudIQ that we report in the results section doesn't always include every kind of alert or report; see each set of results for a breakdown of transmitted data. OME collects, consolidates, and securely transfers health status, alerting, and inventory data over the network less frequently than metrics monitoring to further lessen the impact on network consumption.

Investigating performance with two types of licensing

Organizations have multiple iDRAC licensing options for CloudIQ depending on their specific needs. To account for possible differences in network impacts with different software versions, we tested with two types of licenses: Enterprise and Datacenter. Enterprise licenses include a set of standard metrics, while Datacenter licenses offer additional advanced metrics.

Looking at network impact from an increasing number of hosts

It's no surprise that the more hosts you add to an environment, the more health data travels over the network. So, the amount of bandwidth that your CloudIQ implementation uses will vary depending on your environment setup. To give readers an idea of expected bandwidth usage, we tested first with a single Dell PowerEdge™ R740 server, again with two PowerEdge R740 servers, and then ran a third test with three PowerEdge R740 servers to show how network usage might scale as your environment grows.

Dell CloudIQ offers endpoint data encryption to keep your environment secure

According to the white paper "Dell EMC CloudID: A Detailed Review," CloudIQ takes measures to protect data both in flight and at rest. Some of the data protection features include:

- CloudIQ uses architectural controls as part of the Dell standard secure development lifecycle
- CloudIQ receives notifications through Secure Remote Services and Phone Home Services when storage system metadata arrives
- Both data channels use digital certificates and point-to-point encryption
- CloudIQ data is hosted in a Dell data center that is highly available and offers four-hour disaster recovery SLAs, multi-layered firewalls, intrusion detection, and antivirus/malware protection
- Users access CloudIQ data through a valid support account with authentication via SSO infrastructure

To learn more about the security measures CloudIQ employs, read the white paper at https://dl.dell.com/content/docu81241_cloudiq-detailed-review-a-proactive-monitoring-and-analytics-application-for-dell-emc-storage-systems.pdf?language=en-us.

Across test configurations, CloudIQ monitored infrastructure with negligible network impact

In our tests using a single host, the average data transmission over the hour-long test period was 0.067 KBps for the Enterprise license and 0.071 KBps for the Datacenter license (see Table 1). This small amount of efficiently packaged data traveling over the network shows that using CloudIQ had negligible impact on network performance.

0.067 KBps

average transfer over the network

in a single system test

Table 1: Network impact for monitoring via OME and CloudIQ with a single host. Source: Principled Technologies.

	Enterprise license			Datacenter license		
Category	**Max file size (bytes)**	**Min file size (bytes)**	**Average data transfer (KBps)**	**Max file size (bytes)**	**Min file size (bytes)**	**Average data transfer (KBps)**
Telemetry	693	693		694	691	
Health	N/A	N/A		495	495	
Alerts	N/A	N/A		641	641	
Inventory	415	415		1,618	416	
Average OME transmitted over test (1-hour period)			0.067			0.071
Maximum OME transmitted (20-second interval average)			3			4
Minimum OME transmitted (20-second interval average)			0			0

Using two hosts, the average data transmission naturally increased as OME and CloudIQ had additional hosts to monitor and report on. As Table 2 shows, network impact was again negligible, with average data transmission of 0.056 Kbps for the Enterprise license, and 0.078 KBps for the Datacenter license.

0.056 KBps
average transfer over the network
in a two-system test

Table 2: Network impact for monitoring via OME and CloudIQ with two hosts. Source: Principled Technologies.

	Enterprise license			Datacenter license		
Category	**Max file size (bytes)**	**Min file size (bytes)**	**Average data transfer (KBps)**	**Max file size (bytes)**	**Min file size (bytes)**	**Average data transfer (KBps)**
Telemetry	768	764		2,008	1,596	
Health	504	502		N/A	N/A	
Alerts	N/A	N/A		N/A	N/A	
Inventory	11,503	415		11,748	415	
Average OME transmitted over test (1-hour period)			0.056			0.078
Maximum OME transmitted (20-second interval average)			2			3
Minimum OME transmitted (20-second interval average)			0			0

When we added a third host, the transfer of health and performance information remained small. The average transmission over the network from OME to CloudIQ was 0.206 KBps for the Enterprise license and just 0.089 Kbps for the Datacenter license (see Table 3).

0.089 KBps
average transfer over the network
in a three-system test

Table 3: Network impact for monitoring via OME and CloudIQ with three hosts. Source: Principled Technologies.

	Enterprise license			Datacenter license		
Category	**Max file size (bytes)**	**Min file size (bytes)**	**Average data transfer (KBps)**	**Max file size (bytes)**	**Min file size (bytes)**	**Average data transfer (KBps)**
Telemetry	1,702	1,486		2,466	2,009	
Health	515	494		505	505	
Alerts	N/A	N/A		N/A	N/A	
Inventory	16,694	417		11,744	414	
Average OME transmitted over test (1-hour period)			0.206			0.089
Maximum OME transmitted (20-second interval average)			8			3
Minimum OME transmitted (20-second interval average)			0			0

Conclusion

Whether your Dell PowerEdge servers are in a single data center or spread across multiple locations, administrators can use one cloud-based portal in CloudIQ to monitor all Dell OME environments. In our tests at multiple server counts, the monitoring and reporting data that traveled over the network to CloudIQ was efficiently packaged to have a negligible impact on existing data center networking operations. By giving your admins a tool to make monitoring across environments simpler, you can more easily surface or predict potential performance or health issues in your infrastructure to keep business moving.

1. Dell, "Dell CloudIQ - AIOps for Intelligent IT Infrastructure Insights," accessed February 10, 2022, https://www.dell.com/en-us/dt/storage/cloudiq.htm.

Read the science behind this report at https://facts.pt/Q2yfBna ▶

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