

Enterprise level software for real time monitoring and alerting of power and environmental hardware

The Challenge

Data Centres today are highly dynamic and complex environments, which must operate within optimum conditions to deliver maximum data centre efficiency. The skill is in delivering this complexity in an affordable manner, without limiting business growth or introducing risk into the design and performance.

As IT power demands and densities soar, so do data centre carbon emissions. The struggle is to deliver additional IT performance whilst managing facility power savings and energy costs. So, when focusing on data centre efficiency, consideration must be given to both IT and Facilities costs.

Until now, exchanging information across IT and Facilities has been problematic; in that no one solution has been able to harness information from all zones within the data centre, i.e. the Network Management Server, Building Management System, Power Management System, Energy Management System and Fiscal Primary Metering.

These needs are met by the Panduit Unite DCIQ and Enhanced Reporting Module (ERM) software application and their integration capabilities.

The Solution

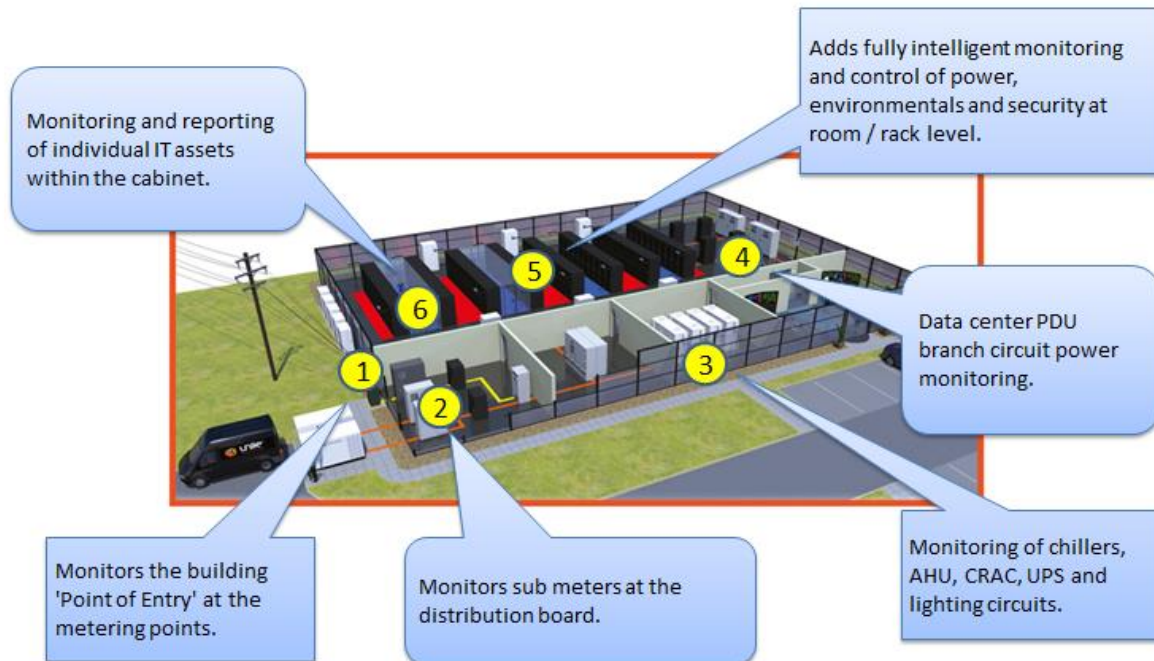


DCIQ Overview

DCIQ is an enterprise-level device monitoring and asset management application. This web-based application allows real time monitoring, alerting and control of the power, environmental and security system of hundreds or even thousands of devices from a single console within the data centre.

DCIQ resides on a central server, communicating via a secure web based interface, integrating into SNMP, ODBC or Modbus device. These devices are polled typically every 15 minutes; their data collected and delivered into the DCIQ SQL database. Here, the information is collated and via the user interface, can be interrogated by the user.

Consolidated Data Collection - 6 Zone™ Data Centre Management



DCIQ will provide information from all 6 zones of the facility including:

- Power, environmental and physical security monitoring of the data cabinets and stand alone equipment.
- Fiscal metering data (electricity, gas, water and oil)
- Data from Panduit Unite management platforms: Hawk-i³, Powerhawk² (legacy), RackKMS, Eagle-i and PDU Expansion Unit, and Envirohawk.
- Data from the following 3rd party Modbus meters to monitor third party plant equipment such as Chillers, CRAC and UPS. The meters include: ND 350; Panduit Unite 350; Powermeters PM710/PM750/PM810; PowerLogic 7550; Autometers IC-970; Diris A40/A41; Nemo 72-L; EM21; Additional meters adhering to standard Modbus standard may be added by the user.
- DCIQ information can be exported into 3rd party databases
- DCIQ customised solution to enable imported data

With this holistic view across the entire data centre, Panduit Unite provides the ease in which to accurately visualise and monitor energy use in real-time, allowing simplified decisions to be made to control power density, efficiency and capacity use.

Management Reporting and Security

DCIQ is a powerful tool to monitor, optimise and manage interdependencies between Facilities and IT infrastructure architectures. The following reports are supported:

- Monitoring, data collection and management of energy usage and efficiency from building point of entry through to an individual server payload.
- Trending and analysis of individual IT payload and supporting facilities plant equipment – information can be used to assist with capacity planning, risk analysis, performance benchmarking and the recovery of power and cooling capacity.
- Variance / Exception Reporting to identify out of norm events.
- Real time / historical monitoring information including dynamic PUE / DCiE.
- Facilities and data centre layouts are graphically imported into DCIQ, enabling a global view of the client's infrastructure (down to an individual rack).
- Historical data collection and management reporting helps make informed decisions, improve energy efficiency, reduce costs and increase facility resilience.
- Detailed CO₂ footprint analysis and mandatory legislative CRC reporting.
- Facility / IT costs over user defined timeframes.
- Load phase balancing and detailed energy and environmental rack level reporting against client SLA's.
- Cabinet security enabling access control to cabinets and data communications rooms.

DCIQ Dashboard View



DCIQ Dashboard View

A single dashboard view shows an organisation's IT power and environmental status, be it an office, computer room or mega data centre. The DCIQ management application replicates the physical world layout of an organisation.

Users are able to define the locations of their monitored equipment by topological geographical locations from region, country, state and city down to campus, building, floor, room and cabinet.

Alerting & Alarm Thresholds

For the provision of 'real-time' monitoring, these devices are configured to transmit alarms immediately as a pre-defined threshold is crossed, providing notification alerts via e-mail and/or SNMP. The 'real-time' alarms are transmitted as the SNMP trap messages on the network to the NMS, which logs the alarm event in the database, and updates a list of currently active alarms.

Supported Alarm Thresholds are:

- Temperature
- Humidity
- Analogue 0~10VDC Sensor
- Open and Close Contact Switches
- PDU Volts
- PDU Amps
- PDU kVA
- PDU kWhr

Other sensors that can be monitored are; differential air pressure, water leak detection (open/close switch), smoke detection, gas detection, etc. The analogue variable parameters such as temperature, humidity, volts, amps etc. have four alarm thresholds namely; upper critical, upper warning, lower warning, lower critical thresholds. Digital alarms such as open/close switches only have a single alarm state, which can be configured to be one of: critical, warning or informational.



DCIQ alarms can be viewed and aggregated to any of the geographical layers and filtered according to type. The aggregated view always shows the highest outstanding alarm.

DCIQ Geographical Layout and Alarm Status View

In addition to this, users can assign their own ticket numbers to alarms to ease tracking, which are prioritised into four main levels:

1. Critical Alarms
2. Warning Alarms
3. Informational Alarms
4. Clear – alarm condition has ceased

Power Monitoring

Power Report Generated From: 21/12/2011 - 21/12/2011													
Region Summary:		Volts (Avg)	Amps (Total Avg)	kVA (Total Avg)	kWhr (Total)								
		235.0	20.8	4.9	1120.7								
Cabinet Summary: Rack1 CAB1 IP Address: 10.0.0.100													
Particular Name		Volts	Amps	kVA	kWhr	Start	End	Change					
		Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Start <td>End <td>Change</td> </td>	End <td>Change</td>	Change
PDUa		243.7	211.1	236.0	9.4	0.0	1.4	2.2	0.0	0.4	63.0	255.3	60.7
PDUb		242.9	232.2	237.5	9.4	0.0	1.4	2.3	0.0	0.4	66.7	255.3	59.9
				3.2									120
Cabinet Summary: Rack1 CAB2 IP Address: 10.0.0.100													
Particular Name		Volts	Amps	kVA	kWhr	Start	End	Change					
		Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Start <td>End <td>Change</td> </td>	End <td>Change</td>	Change
PDUa		244.0	212.2	226.0	9.0	0.1	1.5	2.1	0.0	0.4	62.0	254.4	60.0
PDUb		243.0	231.1	237.0	9.1	0.1	1.4	2.1	0.0	0.4	71.0	264.9	63.0
				3.0									120

The monitoring of power kW, energy kWh, kVA, Volts, Amps can be at the power socket outlet level, power strip level, cabinet level as an aggregated value from all power readings from within the cabinet or at room, floor or building level, again this is an aggregated value from all power readings from within the room, floor or building.

DCIQ Power Report View

DCIQ reports on all of the major power metrics, supporting PUE (Power Usage Effectiveness), DCIE (Data Centre infrastructure Efficiency) and equivalent CO2 tonnage generated by power consumed.

Environmental and Security Monitoring DCIQ monitors the key environmental parameters in temperature and humidity at the cabinet level and this is aggregated to a maximum, minimum and average at any of the geographical levels.

In addition to this, DCIQ monitors all of the open and close switch state alarms, listed below as well as supporting the analogue 0-10VDC alarm sensors.

- Door open
- Lock open
- Handle open
- Smoke detection
- Water detection
- Gas detection

Power Reporting Features



A key feature of DCIQ is its ability to provide a single reporting portal across multiple data sources, both historical and in real time which can be converted into sophisticated management reports. With this information, key decisions can be made to better align IT needs with energy delivery (such as optimised power and cooling and effective capacity planning) with the aim of achieving a Power Usage Effectiveness (PUE) rating of 1.0.

DCIQ Data Hall Layout and Alarm Status View

Two levels of reporting are supported:

1. Reports that are built into the management application itself. These include:

- Users Login Audit Report
- Management Application
- Configuration Change Audit Report
- Configuration Change Audit Report
- Installed Device Report
- Trend reports for power and analogue environmental parameters
- Bar Graph reports showing maximum, minimum, and average values
- Line Graph reports showing multiple variables in a single graph, (i.e. kVA, kWhrs, Temp & Humidity for a single rack)
- Security reporting providing status of doors, locks, and handles

2. Reports provided through the Panduit Unite Enhanced Reporting Module

- Enhanced Reporting Module (ERM) is a web based application that integrates into DCIQ to provide a flexible business information (BI) tool for analysing data.

Why deploy the Enhanced Reporting Module (ERM) with DCIQ?

Panduit Unite recognises the need for a consolidated approach in providing a holistic view of the data centre environment to measure and implement the energy savings that businesses are committed to, such as:

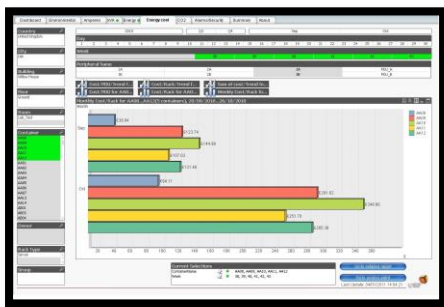
- Real-time dynamic PUE
- Energy efficiency initiatives
- Reduced data centre inefficiencies

The DCIQ and ERM software platforms allow these objectives to be met across the entire data centre facility and will integrate into third party IT and data centre systems, such as the existing Energy and Building Management Systems (EMS / BMS) and asset management tool sets to provide a consolidated report.

Typical reporting parameters within ERM are:

- Alarm status reporting
- Environmental monitoring (i.e. temperature / humidity)
- Capacity management
- Drill-down analysis providing historic information and trending
- Dynamic PUE metric monitoring
- CO² tonnage
- Power and energy monitoring of load draw, kVA, kWhrs, voltage, current, power factor, frequency, energy costs

ERM Dashboard View



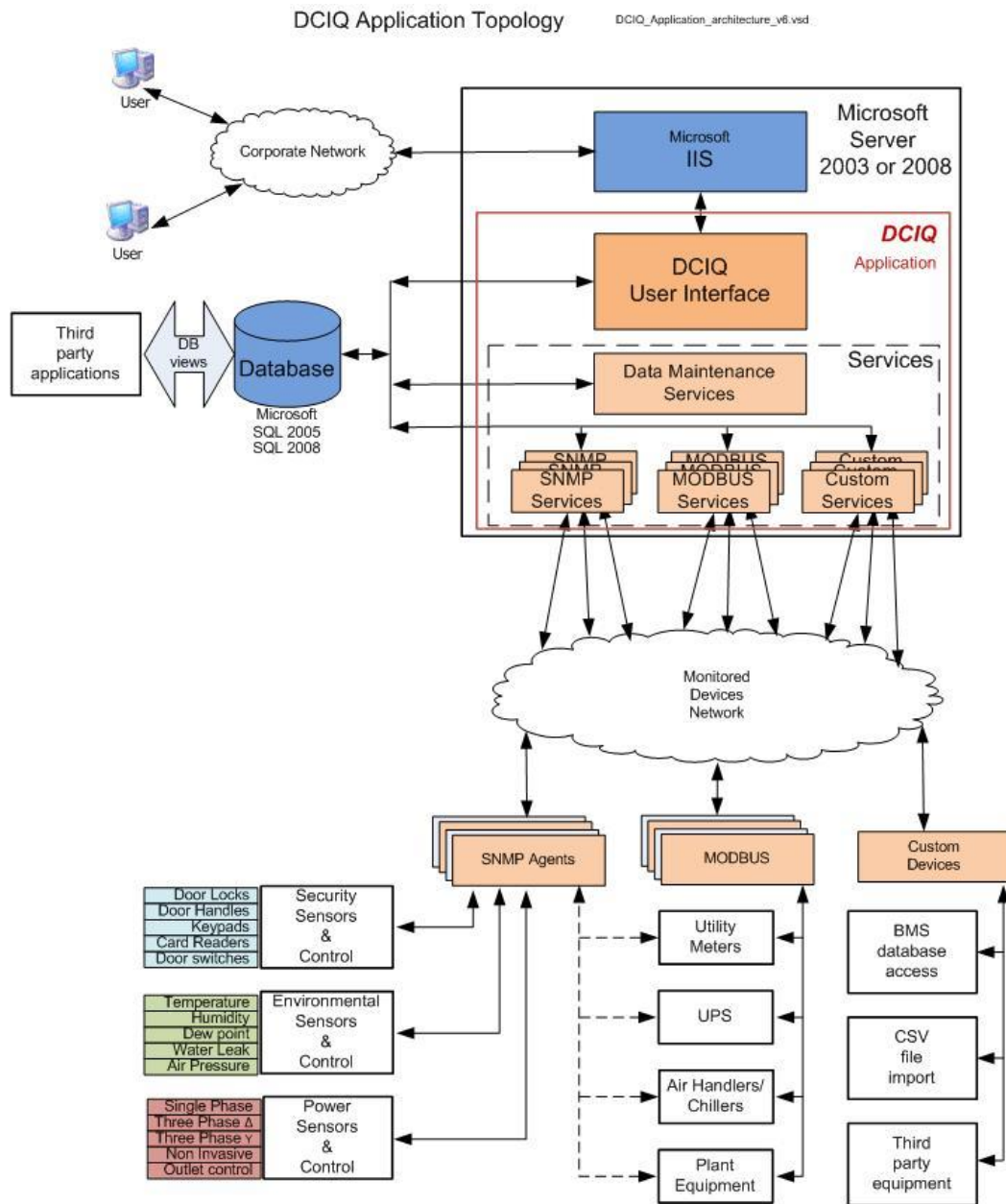
The monthly Energy Cost report takes aggregated kWhr readings and assigns a cost per kW hour for each container to provide a total cost per day / week or month. This view is also available in line graph and table formats.

A summary report is also provided to show total energy cost for the data centre as a whole.

Energy Cost Bar Graph Report (monthly cost per cabinet within ERM)

Consolidated Network View

This shows a consolidated network view of where the DCIQ application will reside.



DCIQ System Requirements

	DCIQ	ERM
Physical or Virtual	Either	Physical only
Operating System	Windows 2003/2008 32/64 bit	Windows 2003/2008 32/64 bit
Processor	Dual Core 2Ghz	Dual Core 2Ghz
Memory	4Gb	4Gb
Disk Space	50 Gb	50 Gb
Screen Resolution	1280x1024	1280x1024
Database	MS SQL server 2005/2008	n/a
Additional requirements	IIS 6, MSMQ, .NET, SQL Management studio	IIS 6, .NET
Web browsers supported	Internet Explorer 7.0 and above, Firefox 3 and opera 10	Internet Explorer 6 or later, Firefox 3, Safari 3 and Google Chrome 1