



# Data Center Infrastructure Management (DCIM) Software

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## General requirements

- R-1 The DCIM Software shall have a scalable system architecture. There shall be no technical limit on the number of objects managed by the DCIM Software.
- R-2 The DCIM Software shall have a Client-Server Architecture:
  - DCIM Server which contains a digital representation of the IT infrastructure
  - DCIM Clients which provide a graphical user interface (GUI) for access to the DCIM Server
- R-3 The DCIM Server shall support multiple simultaneous client sessions.
- R-4 The DCIM Software shall be capable of supporting multiple sites.
- R-5 The DCIM Software shall support the Microsoft SQL as external database and PostgreSQL as internal or external database management system.
- R-6 The DCIM Software shall display the network in a hierarchical tree structure and as geographical network maps.
- R-7 The DCIM Software shall be capable of importing and displaying drawings and maps for accurate representation of geographies and building floor plans. As a minimum, Portable Graphics Format (png) files shall be supported.
- R-8 The DCIM Software shall provide copy-paste and drag-and-drop capabilities for populating floorplans and maps with database objects. It shall be possible to define the position of objects by dragging them to the appropriate position on the map / floorplan.
- R-9 Database Objects that are placed onto a floorplan shall be fully functional so that the administration of objects is possible directly from the floorplan using context menus.
- R-10 The DCIM Software shall not be limited in the registration of users or assets.
- R-11 The DCIM Software shall allow the listing of any information (e.g. manufacturer, article number, model number, name/custom label, mounting type, physical dimensions, weight, data port specifications, CPU, RAM, ...) on any asset.
- R-12 The DCIM Software shall at least allow the creation of places, buildings, floors, data centers and rooms. Rooms and data centers shall optionally have elevated floors. It shall be possible to create sub-hierarchies with places to create an 8- or higher-tiered hierarchy.
- R-13 The floorplan and 3D view shall have the possibility to overlay the floor tiles with a ruler of definable step size, and to export resulting graphics to png. The ruler should also be displayed in the row view.
- R-14 The DCIM Software shall provide graphical representation of rack layouts with front, rear and side views of rack.
- R-15 The DCIM Software shall provide the possibility to display buildings, floors, data centers, rooms, racks and equipment in 2D and 3D views.
- R-16 The DCIM Software shall model the network down to the individual port, cable and fiber level.
- R-17 The DCIM Software shall be able to model any type network, in particular also the power network.

- R-18 The DCIM Software shall be able to make network connections in several ways, among them drag-and-drop.
- R-19 The DCIM Software shall be able to represent splice connections and window-cuts.
- R-20 The DCIM Software shall be able to export an inventory at any level of the infrastructure with equipment, article number and quantities.
- R-21 The DCIM Software shall be able to place Objects on a GIS map, with the accurate longitude, latitude and altitude automatically retrieved.
- R-22 The DCIM Software shall be able to create network connections between different sites using underground ducts on a GIS map.
- R-23 The DCIM Software should be able to switch the visibility of Ducts, Buildings, Places and Manholes on and off.
- R-24 The DCIM Software shall be able to import underground ducts using KML files.
- R-25 The DCIM Software shall allow the choice of different GIS tile providers, including a custom choice.
- R-26 The DCIM Software shall be capable of visualizing connections in the network end-to-end i.e. with all intermediate installation cables, patch cables and patch panels.
- R-27 The DCIM Software shall be capable of visualizing all connections that terminate on a selected device.
- R-28 The DCIM Software shall be capable of visualizing and naming user-defined port-to-port connections.
- R-29 The DCIM Software shall additionally provide the possibility to display cable paths in 2D and 3D.
- R-30 The DCIM Software shall be able to draw ducts (below/above ground and in elevated floor areas), visible in 2D, 3D and on a GIS map.
- R-31 The DCIM Software shall be capable of creating synoptically network drawings showing devices and their connecting cables but omitting geographical data such as buildings, rooms or racks.
- R-32 The DCIM Software shall be delivered with a complete library of object models, which is regularly extended.
- R-33 It shall be possible to import additional models into the library.
- R-34 A built-in model editor shall be available that permits the creation of new models from within the Client GUI.
- R-35 The DCIM Software shall be able to select favorite models in both the model selector and the model editor.
- R-36 It shall be possible to augment object classes with custom fields such as asset tags, MAC, IP or URL addresses, port names, color codes, units etc. Custom fields shall be available in queries and reports.
- R-37 The DCIM Software shall provide mass import functions to populate the database.
- R-38 The DCIM Software shall provide means to perform a tokenized search of any object in the database.
- R-39 The DCIM Software shall provide the possibility to create reports on almost any aspect of the database. Among many options, this may include power capacity availability. Reports shall be freely configurable from within the Client GUI. It shall be possible to export the reports.
- R-40 The DCIM Software shall allow the user to create automated reports to be sent in user-defined intervals to user-defined recipients.

- R-41 The DCIM Software shall be capable of creating graphical charts based on reports. The charts shall be freely configurable. As a minimum pie charts, line charts, bar charts and dial charts shall be available.
- R-42 The DCIM Software shall be capable of monitoring values by polling or setting event traps, and send email alerts in case certain events or specified conditions (e.g. excessive power consumption in a rack) occur.
- R-43 The DCIM Software shall be capable of controlling devices by setting values using SNMP.
- R-44 The DCIM Software should be able to send emails from a Microsoft Office 365 mail server or alternatively any generic SMTP server with basic authentication.
- R-45 The Software shall be capable of monitoring the infrastructure elements and environmental parameters of the data center, their logging and mapping, and the continuous processing of the measured data.
- R-46 The DCIM Software shall be capable of generating cable labels according to freely configurable numbering schemes. It shall be possible to export the cable labels to a labeling printer.
- R-47 The DCIM Software shall provide work order capabilities that include:
- Plan and generate work orders from within the Client GUI
  - Send work orders to installation personnel by email
  - Work orders shall contain individual tasks and bill of materials required to execute the work order
  - Time planning of work orders (GANTT chart)
  - It shall be possible to create dependencies between work orders, e.g. a work order to install a server in a rack is dependent on the completion of another work order to install this rack.
- R-48 The DCIM Software shall provide for management of assets and organizations. It shall be possible to create links between assets / organizations and network objects, e.g. to identify the owner of a device or software applications being installed on a device.
- R-49 The DCIM Software shall have a capacity management function that provides means to search for free capacity in the infrastructure based on rack space.
- R-50 The DCIM Software shall have a storage management function allowing to place objects in storage locations and remove objects from storage to install it in the IT infrastructure. Comprehensive storage reports shall be available.
- R-51 The DCIM Software shall provide configurable multiple user access levels that are based on specific locations, access to objects and the capability to perform operations on these objects.
- R-52 The DCIM Software shall be capable to connect to external user directories using the LDAP and LDAPS protocol.
- R-53 The DCIM Software shall support the mapping of LDAP groups.
- R-54 The DCIM Software shall allow multi-factor authentication (MFA).
- R-55 The DCIM Software shall keep a system log (audit trail), where all changes to the IT infrastructure are recorded.
- R-56 The DCIM Software shall be capable of collecting values from SNMP enabled devices (PDUs, cooling, battery, sensors, active equipment) and associating such values with database objects. The SNMP values shall be collected on a regular basis and stored. The collection intervals shall be configurable. For numerical values, average, maximum and minimum values for certain time periods (day / week / month) shall be calculated.
- R-57 The DCIM Software shall allow the setting of alerts related to the data center, generated via queries or SNMP traps.

- R-58 The DCIM Software shall allow the creation of user-defined dashboards and the sharing of such dashboards among users.
- R-59 The DCIM Software shall generate customizable reports on key performance indicators (KPIs), such as Data Center Space Efficiency (DCSE), Fiber, Copper and Power Port Utilization, Power Usage Effectiveness (PUE), Rack Power Utilization (RPU), Rack Space Utilization, Rack Weight Utilization for sustainability management.
- R-60 The DCIM Software shall allow to display the KPIs in customized dashboards, lists, graphs, in 2D and 3D.
- R-61 The DCIM Software shall allow the integration with third-party software.
- R-62 The DCIM Software shall be deployable in less than 15 minutes.
- R-63 The DCIM Software shall be intuitive and easy to use and a 2-day training should be sufficient to work with the software on a daily basis.
- R-64 The DCIM Software shall provide the option to guide new users through the software with a welcome tour.
- R-65 The DCIM Software shall make tutorial videos available to the users.
- R-66 The DCIM Software shall give all users the opportunity to personalize their application view.

## **DCIM Client Requirements**

- R-67 The DCIM Client shall enable full-featured remote access capabilities to the DCIM Software including electronic work orders, database access, etc.
- R-68 The DCIM Client shall have an easy-to-use Graphical User Interface (GUI). The GUI shall be customizable with various tabs, views and interfaces on a per-user basis.
- R-69 The DCIM Client GUI shall operate in a Web Browser without requiring installation of additional software on the client machine.
- R-70 Communication between the DCIM Server and the DCIM Client shall be encrypted using the HTTPS protocol.
- R-71 The DCIM Client shall allow for flexible enlargement of the window size.

## **Automated Infrastructure Management (AIM) Requirements**

The DCIM Software shall support the following AIM functions:

- R-72 Read connectivity status from Intelligent Patch Panels and display the port status (connected / disconnected) on the DCIM Client.
- R-73 Recognize cable connections between Intelligent Patch Panel ports and update the digital representation on the DCIM Server.
- R-74 Continuously supervise the connectivity status on Intelligent Patch Panels and generate alarms in the case of unallowed changes. Alarms shall be displayed in the DCIM Client GUI and shall be notified by email.
- R-75 Display work orders on Intelligent Patch Panels by activating LEDs on patch panel ports where the work order mandates a change (connection / disconnection)
- R-76 Reconcile differences between the cabling as it is sensed by the Intelligent Patch Panels and the cabling as it is documented in the DCIM Software

## Infrastructure Audit Support

- R-77 The DCIM Software shall be able to create labels that uniquely identify assets. Assets are tagged by adhering the created labels to the assets.
- R-78 The DCIM Software shall have a mobile application capable of registering tagged assets in the software and afterwards displaying all information stored in the software about the registered asset.
- R-79 The DCIM Software shall be able to create audits of the whole or parts of the infrastructure and perform them offline without internet connection. It should allow the user to take notes, add pictures and/or a voice message. The audit should report on matched, unmatched, misplaced and unknown assets.

Alternative descriptions of DCIM:

- data center monitoring and IT registration system