

## 06 – Building Management Systems

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Version	Date	Authors	Summary of Changes
1.0	2012		New document
2.0	05 February 2016	Rajeel Naicker	General Revision
2.1	16 June 2016	Rajeel Naicker	Control types defined

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## Introduction

**06.01** The Campus and Buildings Requirements Manual (the CBRM, the Requirements or the Manual) documents the minimum design and construction requirements for new, refurbishment or repurposed building works, landscapes and engineering/infrastructure projects on buildings, facilities and campuses of the Australian National University (the ANU or the University). The Requirements are prepared for the direction of a Consultant, Designer or Project Manager in the preparation of project specific documentation and in the delivery of project works.

**06.02** Notwithstanding any Consultants particular discipline or area of responsibility, each Consultant and/or designer shall consider the document in its entirety. The complete CBRM consists of the following Sections which may be referred to within this Section:

Campus and Building Requirements Manual	
<b>Section 01</b>	General Requirements
<b>Section 02</b>	Architectural Requirements
<b>Section 03</b>	Roads, Car Parking & Civil Works
<b>Section 04</b>	Soft Landscaping
<b>Section 05</b>	Roofing, Roof Fabric & Roof Safety
<b>Section 06</b>	Building Management Systems
<b>Section 07</b>	Electrical Services
<b>Section 08</b>	Fire Protection Systems
<b>Section 09</b>	Hydraulic Systems
<b>Section 10</b>	Mechanical Services
<b>Section 11</b>	Lifts, Cranes & Vertical Transportation Systems
<b>Section 12</b>	Security, CCTV & Access Control

**06.03** The ANU currently has four major types of Building Management System (BMS) on the Acton Campus. The current BMS controls and monitors heating, cooling and ventilation in administration and critical laboratory environments. In addition, routing of critical laboratory alarms is facilitated through the BMS. The BMS also controls street and certain car park lighting.

**06.04** The University aims to reduce Campus facility operating costs and recurrent capital expenditure. Over time the ANU will progressively mitigate and/or eliminate risks associated with past traditional building services, strategies and systems and the lack of full integration capability.

**06.05** ANU will move from a traditional BMS setup towards an Open System integration. The term Open System refers to integrating multiple services to the Integration Platform then to one uniform front end, refer Figure.01. The base building BMS controls or DDC will utilise BACnet protocol to communicate via the University's WAN to its respective servers and the integration platform.

**06.06** The University is aware of multiple vendors providing BACnet control systems but requires systems installed that are consistent and common to extant systems and components. These systems will provide maintenance staff, building managers and laboratory managers visibility to their building systems to assist in building management and energy usage monitoring.

**06.07** Currently, ANU Facilities & Services accepts the only proprietary controllers with full capability to comply with the requirements listed in this section.

**06.08** Any deviation from these manufacturers requires formal approval from ANU Facilities & Services Division.

**06.09** Automated Logic and StruxureWare controls are the two preferred control types on campus.

**06.10** Except to the extent that the approval, if any, of the Principal includes a contrary provision, the approval is deemed to include the conditions that:

- use of the alternative must not directly or indirectly result in any increase in the cost to the Principal;
- the Consultant must indemnify the Principal against any increase in costs; and
- use of the alternative must not directly or indirectly cause any delay to the Project.

**06.11** The Consultants should request, from the Principal's Representative, a list of approved plant and equipment. Design documentation including drawings, should be based the approved equipment.

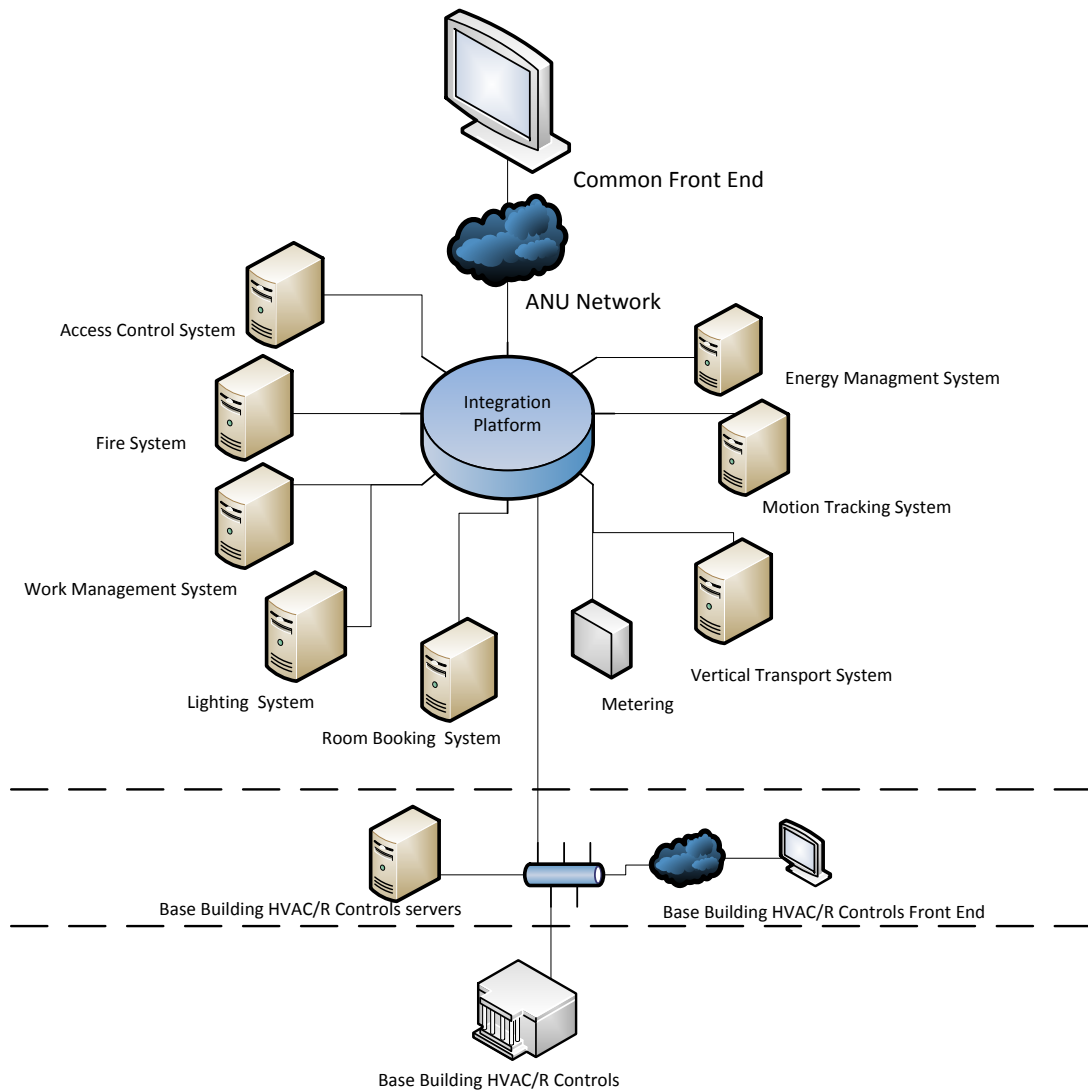


Figure.01

## Main Server

**06.012** Main Server refers to an enterprise application that will communicate with the Master and Field Controllers. Enterprise applications must run on a virtual server.

### 1. Graphics

- a. All graphics on the Main Server must be presented in HTML5 format only;
- b. should support animation;
- c. should have all features listed under Master Controller;
- d. ANU Power Users should be able to fully edit graphics;
- e. graphics should be vector based (optional);
- f. graphics should automatically scale to suit screen;
- g. graphics should be in HTML5 format;
- h. ANU Power Users should be able to control all points on graphics via web access; and

- i. Multi-layer graphics.
2. **Code:** All code should be written in block format only. Users should be able to modify and troubleshoot all code from Field and Master Controllers from the Main Server.
3. **Time Schedule:** All Time Schedules are to be presented in Microsoft Outlook Calendar format or horizontal/vertical bar format. Adding exception Time Schedules must not exceed four clicks. Time Schedules should be written and held in local Field Controllers in BACnet schedule format.
4. **Firmware:** Users must have the ability to push firmware updates to the Master Controller via the Main Server.
5. **User Access:**
  - a. Users must be able to access the Main Server graphics by entering one IP address on an internet browser.
  - b. Multiple users must be able to access the Main Server graphics at once. 50 users should be able to access the graphics at once.
  - c. Roaming PCs with client software to access Main Server graphics is **not permitted**.
6. **Security:** Power Users must be able to block certain users from viewing certain buildings and commanding certain points.
7. **Licensing:** ANU must be informed about all license costs prior to system installation. Enterprise licenses **shall not** be on any external hardware, USB Dongle for example.
8. **Trending logs-** Trend logs must be captured in an SQL database.
9. **Time sync** –via the ANU NTP server.

### Master Controller or Main Plant Controller

**06.013** Master Controller refers to the controller that connects to the Campus WAN to communicate to the Main Server.

**06.014** Master Controllers should have the ability to be a Complete Stand Alone Controller. Complete Stand Alone Controllers should have the following features:

1. **Web Access:** Users should be able access the controller by entering an IP address on any Internet Browser in the ANU local network. This feature is to be used **ONLY** if connection to Main Server is lost.
2. **Graphics**
  - a. All graphics related to the controller should be stored in the Master Controller;
  - b. graphics must be visible via web access;
  - c. graphics should be vector based (optional);
  - d. graphics must automatically scale to suit screen;
  - e. graphics must be in HTML5 format;
  - f. users must be able to control all points on graphics via web access; and
  - g. multi-layer graphics.
3. **Code:** All code should be written in block format **only**. Script code is not permitted.
4. **Time Schedule:** Users must have the ability to change schedules via web access and add time exception. Time Schedules must be written and held in local Field Controllers in BACnet schedule format.

5. **Alarms:** controller must have the ability to send email alarms (SMTP) without relying on the Main Server or a third party software. Refer to [Section.12 Security, CCTV & Access Control](#).
6. **Security:** Automatic log off option and HTTPS option during web access.
7. **Trend Logs:** User should have the ability to view and export trend logs via web access. The preferred format is CSV.
8. **Native Protocols:** BACnet/IP, Modbus TCP, Webservices (optional).
  - a. Gateways and extra-low voltage (ELV) devices must comply with ISO/IEC 14908.4.
9. **Time Sync:** via Main Server.

### Field Controller or Application Controller

**06.015** Field Controller are controllers that connect to the Master Controller and other Field Controllers via a local LAN.

1. **Code:** All code should be written in block format **only**. Users should be able to upload modify and troubleshoot all code from the Main Server.
2. **Exposed Points:** Controllers should have the ability to expose all BACnet points.
3. **One Master Point of Control:** There should be one point in the Field Controller that controls the whole plant. For example the Time Schedule point in the controller should turn off the fans and drive all valves and loops to zero. There should be **only one** master room temperature set point.
4. **Native Protocols** – BACnet/IP, Modbus TCP. Webservices (optional on approval).
  - a. Gateways and ELV devices must comply with ISO/IEC 14908.4.

<b>Naming Format</b>	Campus(Acton)_Building Number(BLD)_Level_Plant_Point  Example: Acton_Bld 124_level01_FCU_FanEnable
<b>Device ID / Instance Number</b>	Contact the Principal's Representative (the Principal or the Principal's Project Manager) for more information.

## MS Cable and Field Hardware Labelling

**06.016** Cable labels should follow the following naming convention:

Naming Convention: McFcPtPn

MasterController\_FieldController\_Point Type\_Point number

Example: 0102BI03

01	Address for the Master Controller
02	Address for the controllers on the Rs485 LAN (local to the master controller)
BI	Binary input or output. (BI,BO,AI,AO,UI,UO)
03	Point number on controller number 02.

**06.017** This naming convention should be consistent from controller to field hardware. Cable number should also be placed on the field hardware with hardware name. Example Room temperature sensor should have labels "Room temp 01 " and "0102BI03 " on the face plate and sensor cable should have label "0102BI03".

**06.018** If points are wired directly to master controller then field controller address will be 00.

### Alarms: BMS Alarm Template

- Items in **red** should be changed to suit.
- Items after // should be removed.
- Emails should be brief and to the point. **DO NOT USE POINT NAMES FOR ALARM DESCRIPTION.** For example, do not use **ANU\_L1\_SFTYSHWER\_FLT** for Level 1 Safety Shower Fault.

Email header	<p><b>To:</b> <i>bmsalarms@anu.edu.au or other email address</i></p> <p><b>Cc:</b> <i>Building manager or other email address</i></p> <p><b>Subject:</b> <i>***CRITICAL ALARM*** or General Alarm (do not change format in Subject line)</i></p>
Email body	<p>*****NO ACTION REQUIRED*****NO ACTION REQUIRED*****</p> <p><b>Building Name :</b> <i>xxxxxxxx</i></p> <p><b>Building Number :</b> <i>xxxxxxxx</i></p> <p><b>Issue:</b> <i>Enter alarm description</i> // Example: Safety Shower level 1 activated.</p> <p><b>Please perform following action</b></p> <p><b>DURING HOURS Mon-Fri: 0900-1700</b></p> <p>***DO NOT LEAVE MESSAGES, ROTATE THROUGH PHONE NUMBERS UNTIL SOMEONE ANSWERS***</p> <p>FIRST CALL: phone number (Person's name and title)</p> <p>SECOND CALL: phone number (Person's name and title)</p> <p>THIRD CALL: phone number (Person's name and title)</p> <p><b>AFTER HOURS Mon - Fri: 1700-0900, weekends and public holidays</b></p> <p>***DO NOT LEAVE MESSAGES, ROTATE THROUGH PHONE NUMBERS UNTIL SOMEONE ANSWERS***</p> <p>FIRST CALL: phone number (Person's name and title)</p> <p>SECOND CALL: phone number (Person's name and title)</p> <p>THIRD CALL: phone number (Person's name and title)</p>