



Converged Building Technologies Group (CBTG)

CBTG

Integrated Approach for Information Communication
Technology (ICT) and Control System Infrastructures
within Buildings.

An Independent Study.

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Content provided by

- Turner & Townsend
- hurleypalmerflatt
- Strategic ICT Consulting



PREFACE

There is growing impetus within the Construction industry to investigate, develop and deliver integrated systems within buildings to leverage benefits from standards based network technology that has been common place in the IT world for many years.

To this end several manufacturers are developing IP based components and sub systems that perform various functions within the building environment that either replace or complement traditional systems. Typically these systems would include HVAC, Fire and Alarm, BMS, Security and access control. The current traditional approach at building design stage is to break these systems down into separate autonomous systems. These are subsequently dissected into individual work packages within the project. Typically these systems will have their own cabling infrastructures, project teams, and implementation schedule within the project programme.

Each of these duplications adds a cost to the bottom line of the overall project budget. This approach requires a significant level of coordination with other package teams and the overall design team. Inherently this leads to substantial amounts of information being passed around between various members of various teams so coordination and implementation can be very difficult to manage.

The integrated open systems approach hopes to address these issues directly and to demonstrate several important benefits, not least capital cost reduction, utilisation of common infrastructures and reduced deployment times. It is important to note here that traditionally ICT systems for client / user LAN and WAN infrastructures, typically Structured Cabling Systems (SCS) are not in the design scope at this stage. The integrated open systems approach requires the ICT SCS to be included far earlier in the design stage, and demonstrates this as a key requirement.



INTRODUCTION

The purpose of this paper is to outline findings of a study into the benefits and risks associated with the integrated open systems approach in comparison with the traditional approach. The findings are from an independent in-depth analysis of the detailed designs and associated costs that have been developed for a typical building based upon detailed design specifications. It is worth noting here that the integrated open systems approach can be applied to any building irrespective of its function.

The independent review process included

- The design process
- An independent design review
- A project hierarchy comparison analysis
- An in depth Cap-ex and life cycle cost comparison analysis

This work has been carried out by respected independent consultants, hurleypalmerflatt (ICT & M&E Design Consultants), Turner and Townsend (ICT / M&E Cost and Project management Consultants) and Strategic ICT Consulting (Strategic Level ICT design and cost/risk analysis consultants).

The consortium called the Converged Building Technology Group (CBTG) have commissioned this independent study.

CBTG is currently made up of industry key players and includes Tour Andover Controls, Molex Premise Networks and ADT Fire & Security plc, a summary overview of each is outlined within the appendices of this document.

OVERVIEW

CBTG has developed an integrated open systems approach to address the problems associated with the traditional project and technology approach. The integrated approach utilises readily available IP based system components to deliver a modular non-proprietary open system that is ready for the marketplace and has already been deployed in practice. The adoption of the integrated approach enables all key building services to operate under one integrated network saving substantial amounts in capital expenditure and operational costs.

This approach utilises a common structured cabling system to underpin all services on the ICT network in an open IP-based scenario and, therefore, requires only one design specification, one project manager and one major electronic control and monitoring system.

TYPICAL BUILDING MODEL

For the purpose of this study a typical building model was used, the outline specification is as follows:-

- 8 floors of office and HQ facilities
- Max 1500 people capacity
- Central core 10m from the edge 3 sides and 16m on the 4th side
- 13,500 sq mtrs.
- Provides a classic 80:20 net to gross on its floor area
- Plant on the roof and in the basement



THE TRADITIONAL APPROACH

For the sake of conciseness it is assumed that the audience is aware of the typical traditional approach. This approach generally involves the building infrastructure to be split into separate work packages, i.e. BMS, Fire, Access, HVAC etc and each one has its own associated cabling system, design, project management and deployment teams. It is worth noting here, as it is fundamentally important to realise, that each of these packages are treated as separate projects within the build and as such it can be difficult to communicate & integrate the individual designs. Historically the structured cabling system for voice and data is left to the very end of the build and is the last system to be installed and therefore cannot easily be utilised by other system designs.

THE INTEGRATED APPROACH

The integrated systems approach treats the whole system as one project and hence has one project team, one design team and one deployment team. The benefits here should seem obvious, as there is a much flatter project hierarchy and better communication between members of the design and deployment teams.

Solution

The developed solution from CBTG incorporates:

- Turnkey project management (a flat hierarchy)
- Low energy, low running cost design

- IP network
- CAT 6 & fibre optic structured cabling system
- Fully intelligent open protocol BMS
- Fully integrated fire and security system

IP Network

- Layer 3 switching to support multiple VLAN's
- 10/100 Mbs connectivity to desktop
- Day one support for 1100 users plus associated peripherals
- Scalable

Structured Cabling System

- CAT 6 copper horizontal cabling supporting 2550 work area outlets
- Fibre optic IP & copper voice backbone supporting communication rooms connectivity
- Additional 320 CAT 6 horizontal outlets supporting BMS/Security systems (ceiling).

BMS

- 2600 point BMS system
- Compliant to BACNET ISO standards at all levels
- High degree of factory based installation and testing
- Full software integration to all major M&E plant
- Optimised low energy strategies
- Metering and monitoring requirements of Part L2 building regulations

Fire and Security

- The Fire, PA/VA, CCTV, Access Control and Intruder Alarm systems to be integrated to the BMS (fail safe independent system operation)



- The systems consists of 400 fire devices, 400 speakers, 42 cameras, 46 access control readers and 15 intruder alarm points.
- All systems are designed to meet current standards and regulations

Integrated systems over IP networks

- Integrates Security & Building Management Systems Utilising BACNET
- Field Level Integration
- True Peer to Peer communication
- ISO Standard at all Levels
- Robust, Flexible & Scalable
- Interoperable
- Removal of duplication & cost

COST COMPARISONS

The cost comparisons between the integrated approach and the traditional approach show a saving of 24.2% based on the specific model utilised for this review. The savings also constitute approx 4.5% saving across the whole build project.

(An in depth cost plan comparison for line item details is available on request).

In summary the costs are as follows:-

<u>Desc</u>	<u>Integrated</u>	<u>Traditional</u>
<i>CATA</i>		
BMS Controls	262,229	498,168
Inverters etc	67,320	
Lighting Cntrl	60,000	90,000
Fire alarm		242,352
PA/Voice Eva		40,392
Fire / Pa & Voice evac	182,437	
CCTV	51,100	65,000
Access Cntrl	43,284	75,000
Total CAT A	666,370	1,010,912

Capex costs cont...

CAT B

BMS Controls	(inc in Cat A)	143,000
Inverters etc	22,000	-
<i>CAT 6 & Fibre</i>		
SCS inc cabs etc	318,000	253,000
Network S.I. PM	60,000	-
Total CAT B	400,000	396,000
Total CAT A/B	1,066,370	1,406,912

This constitutes a saving of £340,542 when using the integrated open systems approach compared to the traditional multi package (stand alone system) approach. The major cost advantage to the integrated approach is that the structured cabling system is moved to CAT A stage and becomes an enabler for other systems to utilise, therefore reducing proprietary cabling and associated costs.

Life Cycle costs analysis

This model underwent a detailed life cycle cost analysis over a 30 year period. The results are as follows:

Typical costs per Sq M

Traditional	90p / Sq M P.A.
Integrated	57p / Sq M P.A.

This indicates significant operational cost benefits over the life of the building when utilising the integrated approach.

The cost savings are predominantly derived from savings in labour costs. The integrated nature of the system is also an enabler for faster maintenance / upgrade implementation and therefore lower op-ex costs.



BENEFITS AND RISKS

The following benefits can be demonstrated if the integrated approach is utilised.

Commercial Benefits

- Single Network Integrator
- Efficient project hierarchy
- Shorter lead times for design, deployment and test
- Single point of contact for contractual issues
- Single point of contact for problem reporting and escalation
- Demonstrable cost savings of between 20% to 30% across the active/passive infrastructure and control systems delivery
- A defined delivery model that can be replicated across projects

Technical Benefits

- Ability to deploy equipment more efficiently
- Single structured cabling infrastructure for maximum coverage and flexibility
- Integrated design approach allowing efficient design development and reducing timelines
- Future proofing
- Common infrastructure resiliency
- Autonomous controller fall back operation
- Common upgrade path
- Common centralised management systems
- Remote management capability
- IP / Standards Compliance
- Open System Architecture

The risks are more likely to be from the commercial aspects of the project, as the contract will be with one network integration company, and the perception could be that "all the eggs are in one basket".

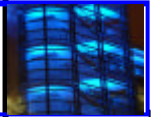
However bearing in mind the described technical benefits with strong contract management and due diligence with reference to financial undertakings this risk can be mitigated to a satisfactory level.

SUMMARY

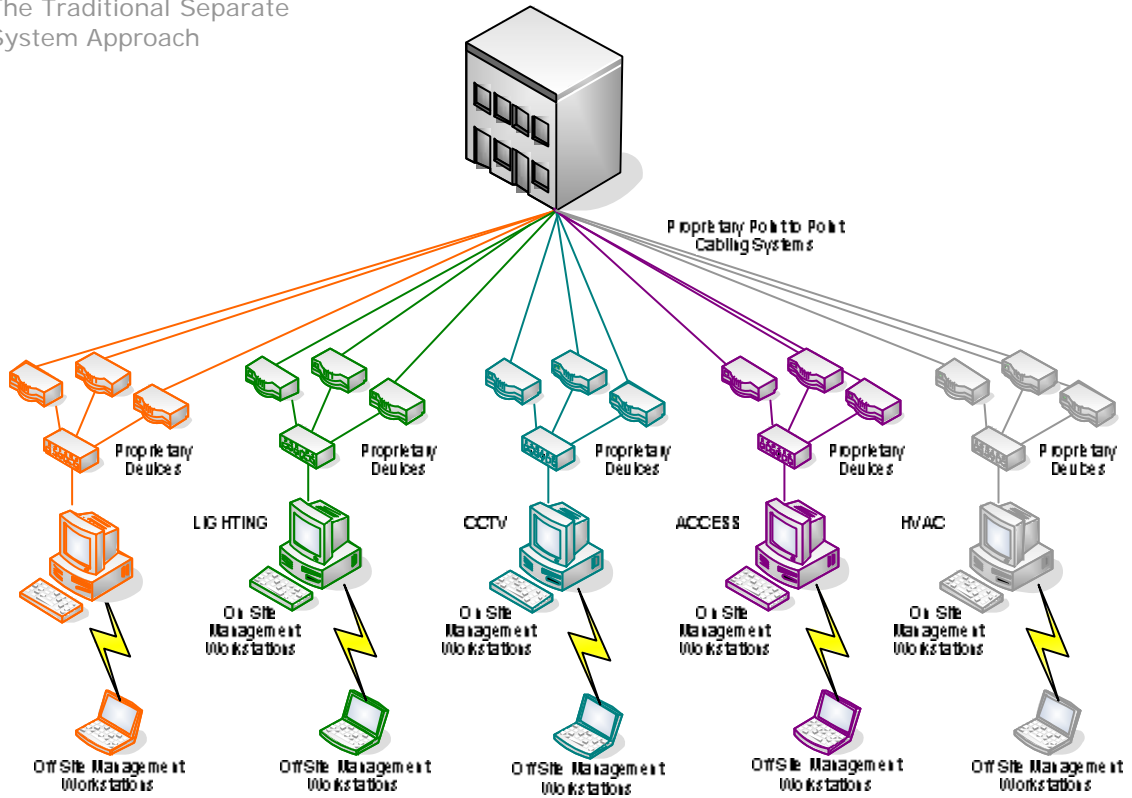
Based on the findings of the study there is a strong case for the utilisation of the integrated approach. There is clear evidence from the study findings that there are both commercial and technical benefits. The system is effectively scalable over the life of the building, thus obviating large upgrade costs and minimising ongoing Opex.

The integrated approach does require different thinking from the outset and has to be considered during initial design phases, otherwise the stated benefits would not be gained. This requires a change in the current traditional methodology, where the building's control infrastructures and data management systems are currently the last phase in the design loop. At this stage it is far too late to change the project structure. It is generally cost prohibitive to retrofit this type of system unless in a full refurbishment environment.

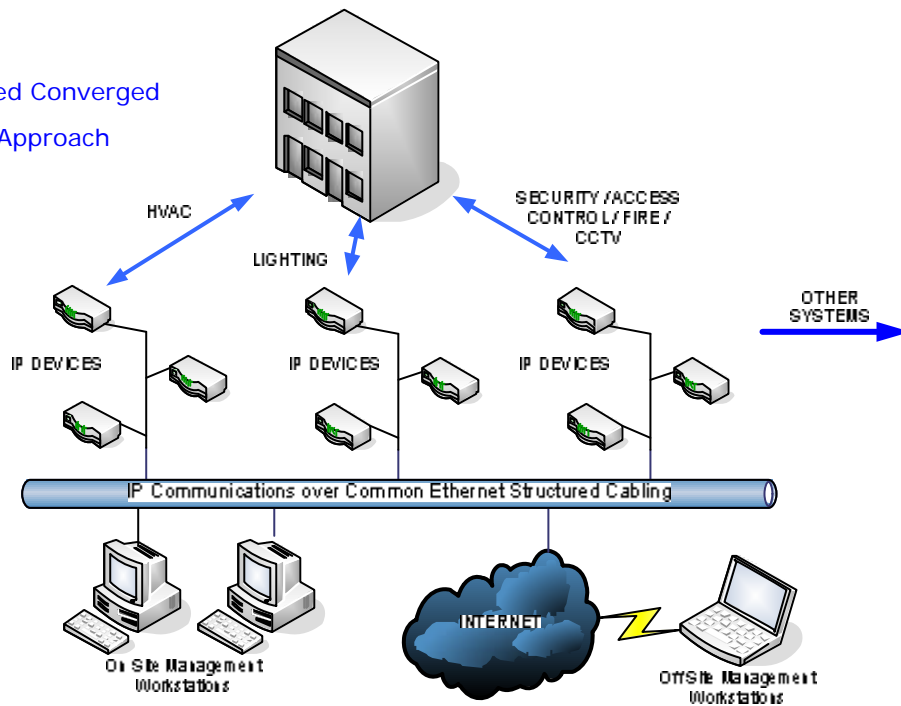
As converged technology evolves over the coming years based on a business requirement to derive cost benefits, the integrated approach will increasingly become the norm.

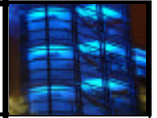


The Traditional Separate System Approach



The Integrated Converged Technology Approach





Participating Key CBTG Members

Tour Andover Controls — www.tac.com

Tour Andover Controls (TAC) is a leading high-tech manufacturer of "Smart Building" systems. Founded in 1975, Tour Andover Controls has more than 100,000 facility management systems installed worldwide in a wide variety of applications, including offices, manufacturing sites, retail locations, hospitals, sports arenas, correctional facilities, schools, and other facilities of any size.

The company has 2,700 employees worldwide and revenue of approx \$700 million for 2004.

Molex Premise Networks—www.molexpn.co.uk

Molex Premise Networks is a subsidiary of Molex Incorporated, a 62-year old manufacturer of electronic, electrical and fibre optic interconnection products and systems, switches and application tooling. Based in Lisle, Illinois, USA, the company operates 55 manufacturing facilities in 19 countries. Molex's revenue in fiscal 04 was \$2.2 Billion.

Molex Premise Networks manufactures a wide portfolio of products specific to the transmission of voice, data and video imaging signals. In supplying innovative structured cabling solutions worldwide, the Molex Premise Networks reputation is one of technological excellence. Molex Premise Networks offers a comprehensive range of both Category 5e and Category 6 products for virtually any application. These products exceed all relevant international performance standards, including TIA/EIA-568-B, ISO/IEC 11801: and AS/NZS 3080.

ADT fire & Security plc —www.adt.co.uk

ADT Europe, part of Tyco Fire & Security, has an annual turnover of \$1.6billion and employs 18,000 people spread over 200 offices in 19 different countries.

ADT addresses the security and safety needs of a number of markets from small businesses right the way through to large complex installations in both the private and public sectors with a range of products that include fire detection and alarm systems, extinguishing solutions, CCTV, intruder alarm devices, access control and building management systems.





Independent Consultants

hurleypalmerflatt

hurleypalmerflatt is a leading multi-disciplinary engineering consultancy. Through strong partnerships with clients and the constant pursuit of excellence, they provide quality solutions in: Building Services Engineering, Structural & Civil Engineering, FM & Property, Building Surveying, IT & Telecommunications, Health & Safety. They work with blue-chip clients in the commercial and public sectors throughout the world.

<http://www.hurleypalmerflatt.com>

Turner and Townsend Group

Turner & Townsend has been providing construction and management consultancy services for over 50 years, and is today one of the largest independent groups in this field.

Turner & Townsend provides expert Cost Management skills among other key services as you would expect from a major consultancy with extensive experience and reputation in this industry.

<http://www.turnerandtowntsend.com>

Strategic ICT Consulting

Strategic ICT Consulting provides consulting services within the ICT arena of voice, data and converged networks combined with associated infrastructures (both active and passive) in various market sectors. The primary objective is to add value and vision at a strategic level in project concept stage. They have extensive cross sector industry experience in multi million pound ICT systems projects.

<http://www.strategicictconsulting.co.uk>

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