Integrated Systems
in
High Reliability Applications

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New York 2006
DATACENTER FACILITIES & ENGINEERING CONFERENCE / EXPO
28th March, The Hilton New York - Avenue of the Americas

Overview

- Methodology of Systems Design for ELV Applications
- Reliability Concerns
- Integration Decision Process
- Commercial vs. Industrial Systems
- Case Study – Industrial Systems
- Case Study – Commercial Systems
- Cost Considerations
- Lessons Learned

Methodology for Systems Design for Extra Low Voltage Systems

- Develop an “Owner Design Requirement”
- What is the intent of each of the subsystems within the facility?
- What sources of reliability are available to support these systems?
- Define the interaction required between the facility subsystems
- Develop a schematic design of the intended monitoring system
- Perform a fault analysis on the ELV system

Key System Features - Operator Interfaces

- Operator Interfaces
  - Who needs to be able to perform what functions?
  - Remote connectivity & access
  - Remote alarming
  - Trending capability
  - Historical data recording/archiving
  - Scheduling requirements
  - Reporting capability
  - Operator interface (graphical presentation)

Key System Features - Panels

- Control and Monitoring Panels
  - What functions will they perform?
  - Can they be shared between subsystems?
  - Will they perform integration of subsystems?
  - What individual redundancy is required at the panel?
    - Processor
    - Power Supply
    - Network connectivity
  - What will happen if a panel component fails?

Key System Features - Networks

- Communications Network
  - What connectivity will be available within a structured cabling system?
  - Are dual network connections required?
  - Can “looped” network fulfill the requirements?
  - Redundancy requirements of any routers/repeaters

Key System Features - Integration

- Why Integrate Anything?
- What System(s) Will Be The Backbone?
- What Subsystems Should Be Considered?
- Customized vs. “Off of the Shelf” integration software

Integration

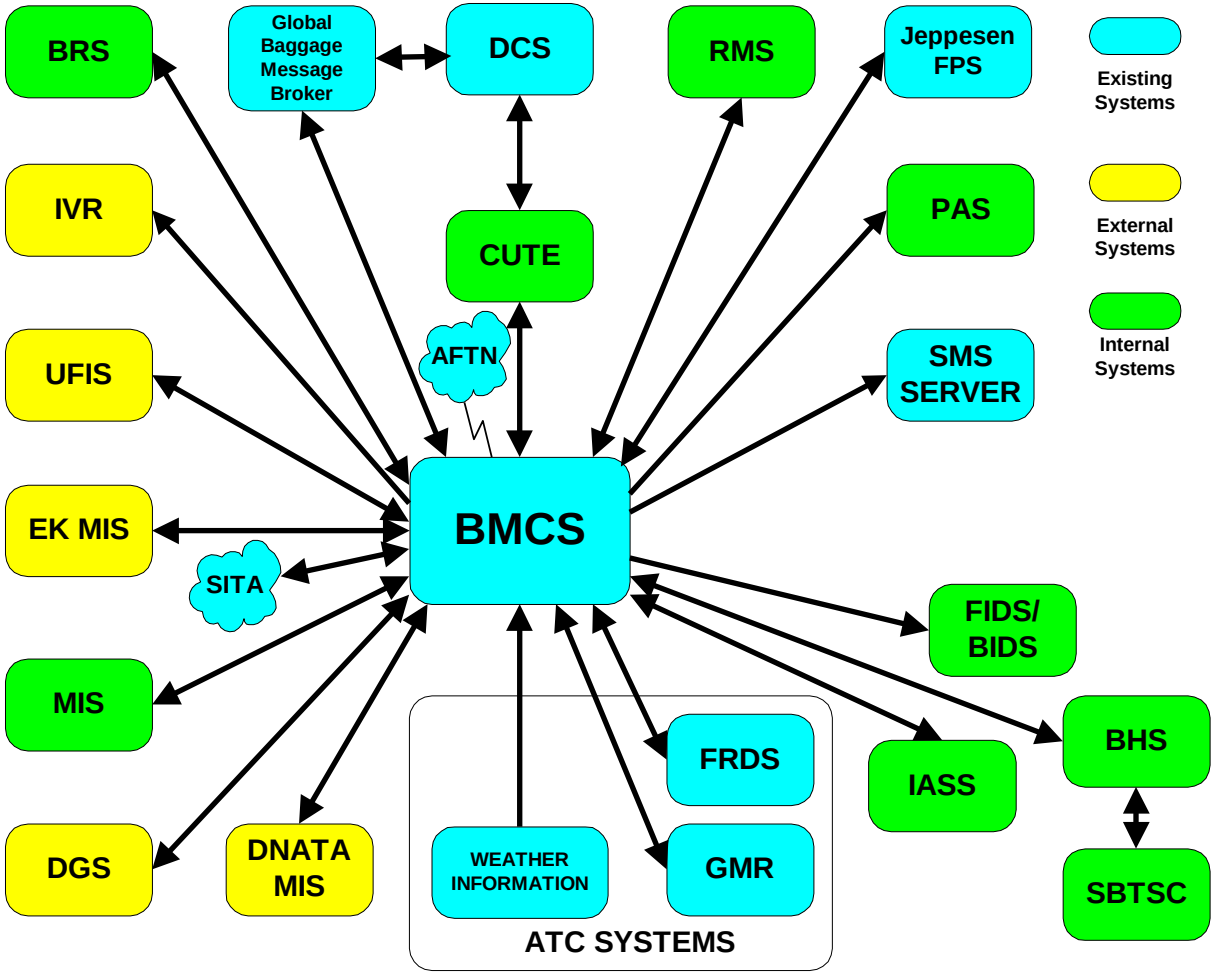
- Does our ODR direct us to integration?
- What is the intent of the integrated system?
- There should be a perceived benefit for interaction between building systems.
- Integration between two systems should result in the exchange of information that aids in the operations of the facility.

Integration - Backbone

- Backbone – the system that will be the centralized host for passing information between systems
- Most common options
  - Automation System (i.e., building temperature control systems)
  - Access Control System
  - Separate Dedicated System
  - One of the “other” facility systems

Integration - Subsystems

- Building Management and Control System (HVAC temperature control)
- Security Access Control
- CCTV Surveillance
- Lighting Control
- Elevator Control
- Electrical Controls & Monitoring
- Computer Room AC Units
- UPS
- Electrical Paralleling Gear
- PDU
- Standby Power Generation
- Thermal Metering
- Parking Control
- Fire Alarm
- Point of Sale
- Electrical Metering
- Fuel Monitoring and Delivery Systems
- Other special systems



AFTN - Aeronautical Fixed Telecommunication Network
BHS - Baggage Handling System
BIDS - Baggage Information Display System
BMCS - Integrated Building System
BRS - Baggage Reconciliation System
CUTE - Common Use Terminal Equipment
DCS - Departure Control System
DGS - Docking Guidance System
DNATA MIS - Dnata Management Information System
EK MIS - EmiratesManagement Information System
FIDS - Flight Information Display System
FPS - Flight Planning System
FRDS - Flight Refuelling Display System
GMR - Ground Movement Radar
IASS - Integrated Aircraft Stand System
IVR - Interactive Voice Response
MIS - Management Information System
PAS - Public Address System
RMS - Resource Management System
SBTSC - Suspect Baggage Tracking System for Customers
SITA - Société Internationale des Télécommunications Aéronautiques
SMS - Short Message Service(cell phone messages)
UFIS - Existing Management Information System

AVIATION SERVICES INFORMATION SYSTEMS

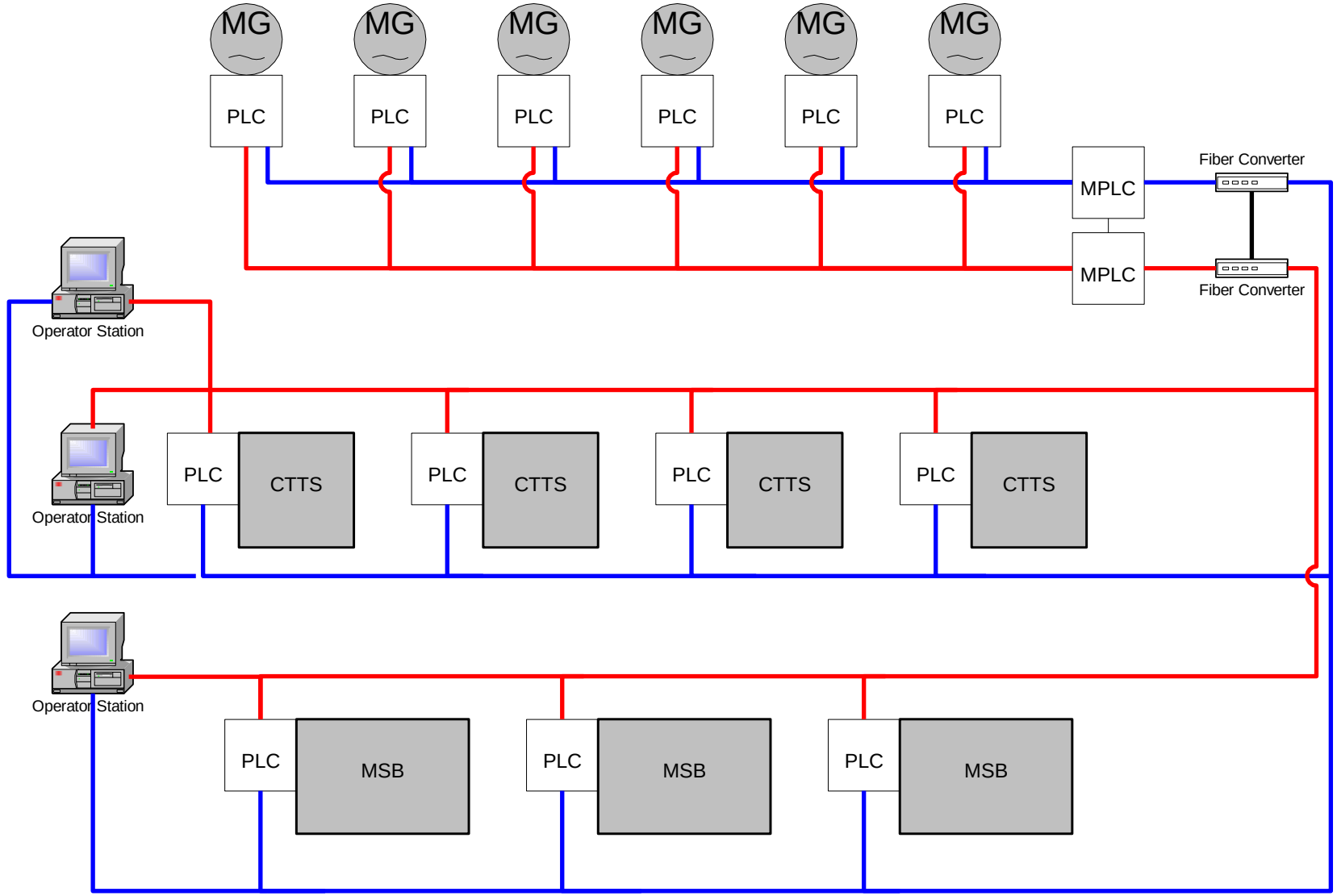
Industrial vs. Commercial Solutions

- Industrial
  - PLC based
  - Electrical monitoring
  - High reliability for simple control schemes
  - Dynamic simulation
- Commercial
  - Commercial Controls
  - HVAC control & monitoring
  - Electrical monitoring
  - Reasonable reliability for complex schemes

Case Study – Industrial Controls

- SBC – now called AT&T
- Supports SBC system wide – southern US
- 400 kSF raised floor data center for SBC Communications
- 12 level building in Dallas Central Business District
- Facility comprises:
  - Three 2,400 kW UPS – 2N
  - Computer equipment is supported by 28 – 600 Amp static transfer switches – 2N
  - 2,000 Tons of AC – N+1 on a zone (floor) basis
  - Six 2 MW standby generators paralleled with one 2 MW unit being redundant – 2N+1
  - Central cooling plant that serves downtown complex and comprises a total 7,400 tons of chiller capacity and 14-600 ton cooling towers – 2N+1

Case Study – Industrial Controls



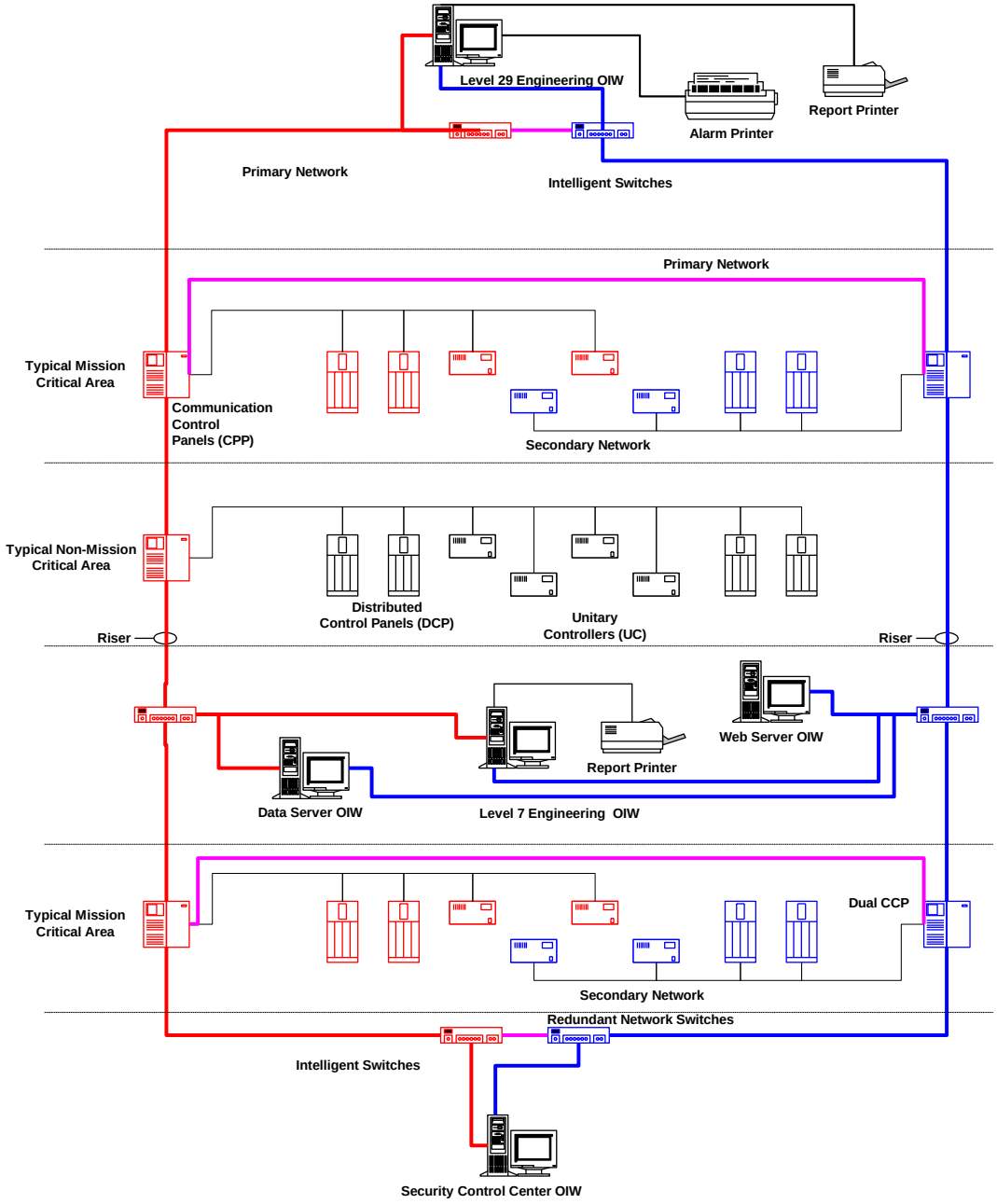
Case Study – Commercial Controls

- ABN AMRO Bank
- 1.1 Million g.s.f.
- CBD Chicago
- Public - Level 2
  - Cafeteria, Health Club, Security
- Podium – Levels 3-8 (300k s.f.)
  - Data Center
  - Trading Floor
  - Check Processing
  - Mail Distribution
- Tower – Levels 9-29
  - 9-14 High Reliability support for podium functions
  - 15-29 Normal Office

Case Study – Commercial Controls

- Dual/split capability central mechanical plants – 2N
- Dual chilled water distribution – 2N
- Unitized mechanical system in critical areas – (salt & pepper)
- Dual power feeds to site – 2N
- Dual water feeds to site – 2N
- Dual UPS provisions throughout – 2N
- Dual power generation plant – 2N

ABN AMRO


Level 29 Engineering OIW
Alarm Printer
Report Printer
Primary Network
Intelligent Switches
Primary Network
Typical Mission Critical Area
Communication Control Panels (CPP)
Secondary Network
Typical Non-Mission Critical Area
Distributed Control Panels (DCP)
Unitary Controllers (UC)
Riser
Riser
Web Server OIW
Report Printer
Data Server OIW
Level 7 Engineering OIW
Typical Mission Critical Area
Dual CCP
Secondary Network
Redundant Network Switches
Intelligent Switches
Security Control Center OIW

Cost Considerations

- Deciding What to Integrate
- What level of integration can we afford?
- Try to use “off of the shelf” solutions
- Prepare a proper commissioning plan – it will save you time, and possible money

Big John's Rules of the Road

- Have a plan on how to operate the facility
- Too much can be worse than not enough
- Be very specific in defining interoperability
- Bench-test ALL integration
- Commissioning is not an option
- If you are embarking on the "bleeding edge" – take a first aid kit with you

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