Intelligent Building Systems

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DEFINITION OF AN INTELLIGENT BUILDING

"An Intelligent Building is one that provides a productive and cost-effective environment through optimization of its four basic elements:

Structure

Systems

Services

Management

and the interrelationships between them. Intelligent Buildings help Owners, Property Managers and Tenants realize their goals in the areas of cost, comfort, convenience, safety, long-term flexibility and marketability."

Intelligent Building Institute, Washington, DC.

"An Intelligent Building is one that maximizes the efficiency of its occupants while at the same time allowing effective management of resources with minimum life time costs"

European Intelligent Building Group.

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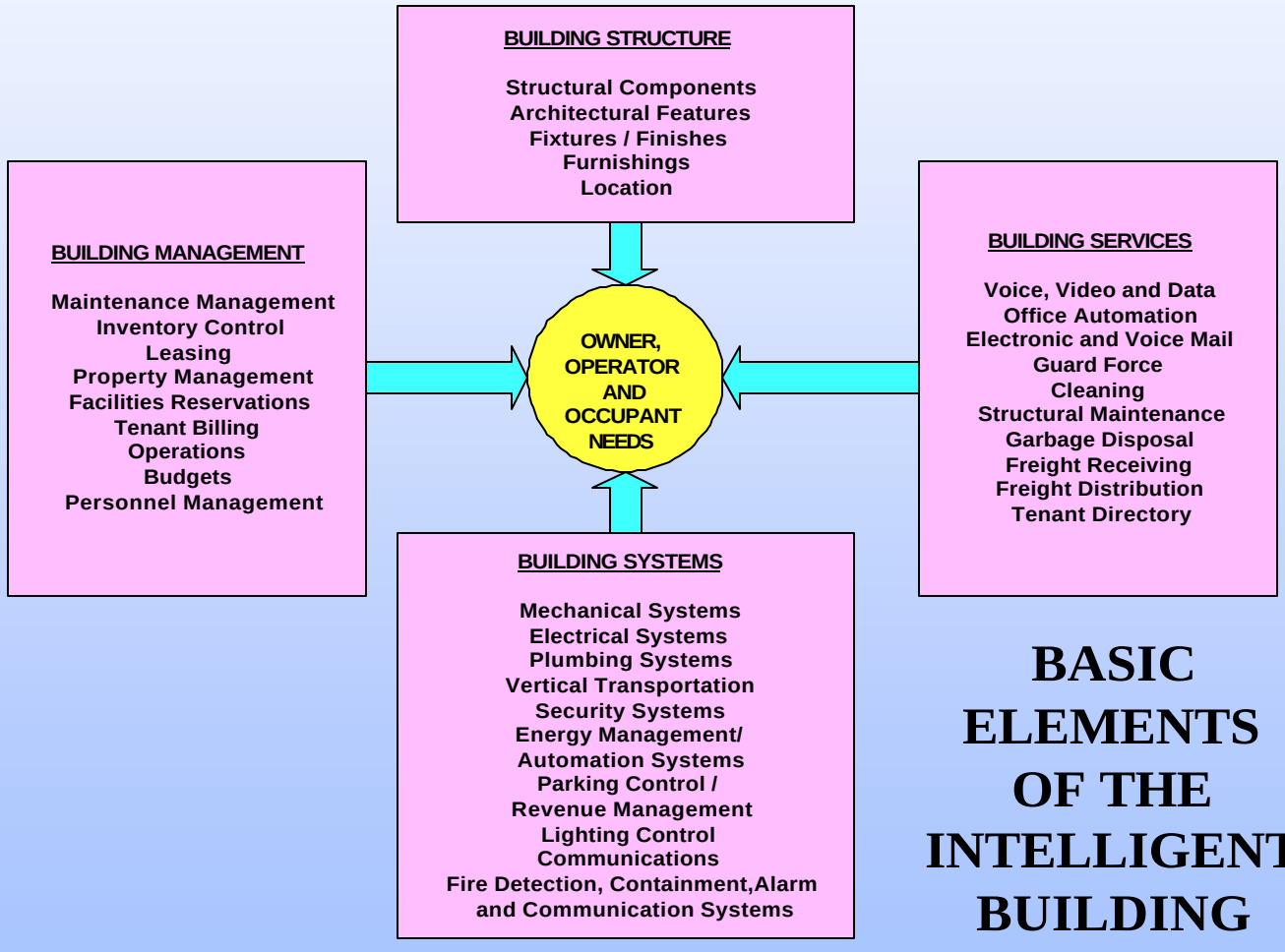

BASIC ELEMENTS OF THE INTELLIGENT BUILDING

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COMPUTER BASED SYSTEMS IN THE INTELLIGENT BUILDING

SYSTEMS THAT SUPPORT THE OPERATION OF THE BUILDING:

- Integrated building security system
- Elevator control system
- Building energy management / automation system
- Electrical distribution control system
- Fire, detection, containment, alarm and communication system
- Audiovisual

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COMPUTER BASED SYSTEMS IN THE INTELLIGENT BUILDING

SYSTEMS THAT SUPPORT THE OPERATIONS OF THE TENANT:

- Audiovisual
- Telecommunications systems (telephone, office automation/data systems, teleconferencing)
- Security system (add-on to the base building system or separate system)
- Energy management/Automation system (add-on to the base building system and/ or separate system)

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FIRE DETECTION, CONTAINMENT, ALARM & COMMUNICATION SYSTEM

Components:

- Fire and Smoke Detection Sensors
- Fire Fighters' Communication Systems
- Fire Annunciation Systems
- Fire Fighters' Panel

Functions:

- Fire & Smoke Detection and Alarm Annunciation
- Fire & Smoke Containment
- Override Control of Door Access & Egress
- Override Control of Elevator Control System

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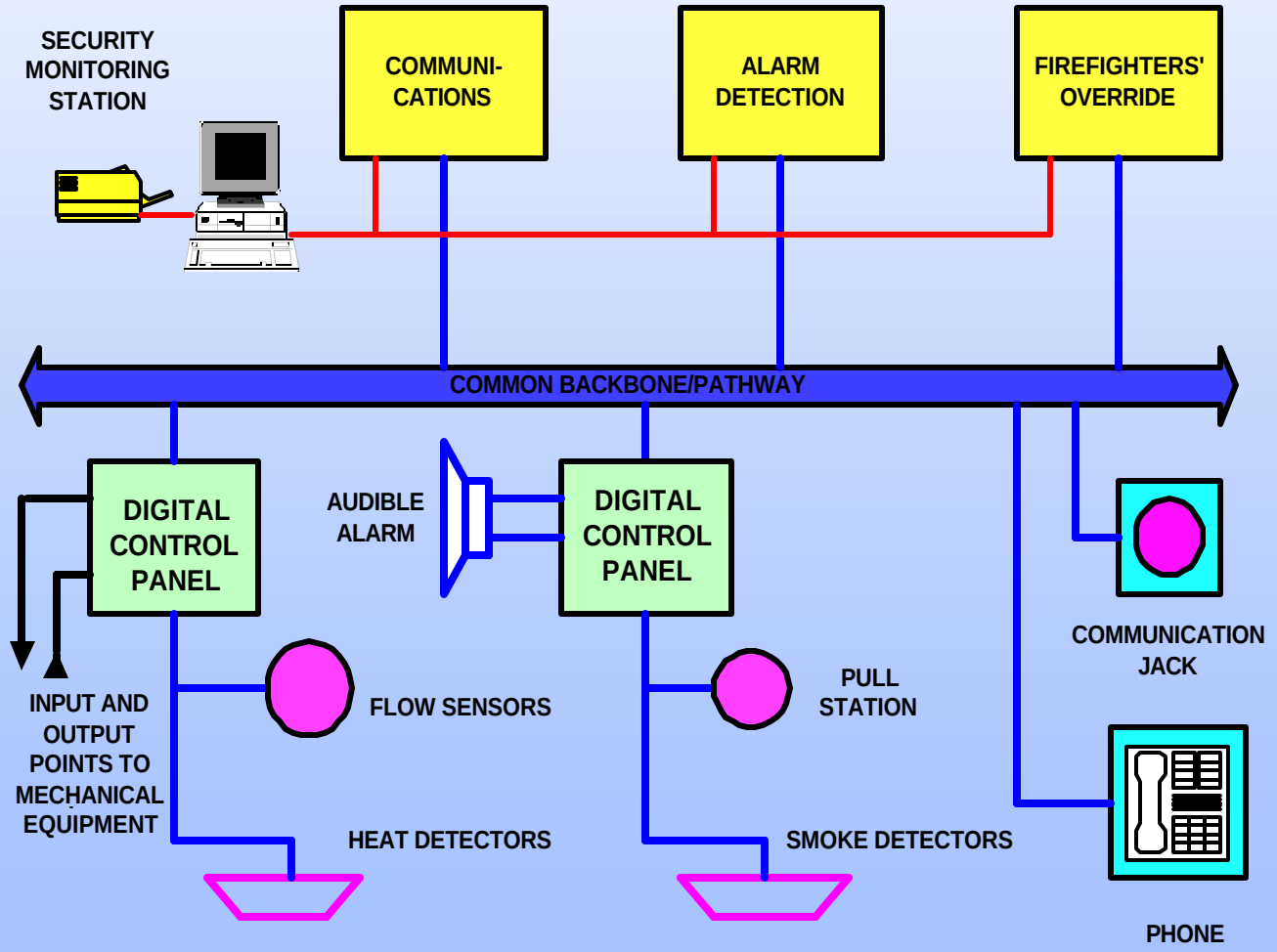
ILLUSTRATION OF A TYPICAL FIRE DETECTION, CONTAINMENT, ALARM AND COMMUNICATION SYSTEM



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FUNCTIONS OF THE INTEGRATED SECURITY SYSTEM

Functional Integration of:

- Alarm Monitoring & Annunciation
- Access Control & Monitoring
- Closed Circuit Television
- Audio Surveillance, Paging, Emergency Phones, Intercom & Radio Facilities
- Guard Tour Management
- Activity Archiving, Reporting & Audit Trails

Additional Functions:

- Parking Control & Revenue Management
- Elevator Supervisory Control & Surveillance
- High Performance Surveillance Systems

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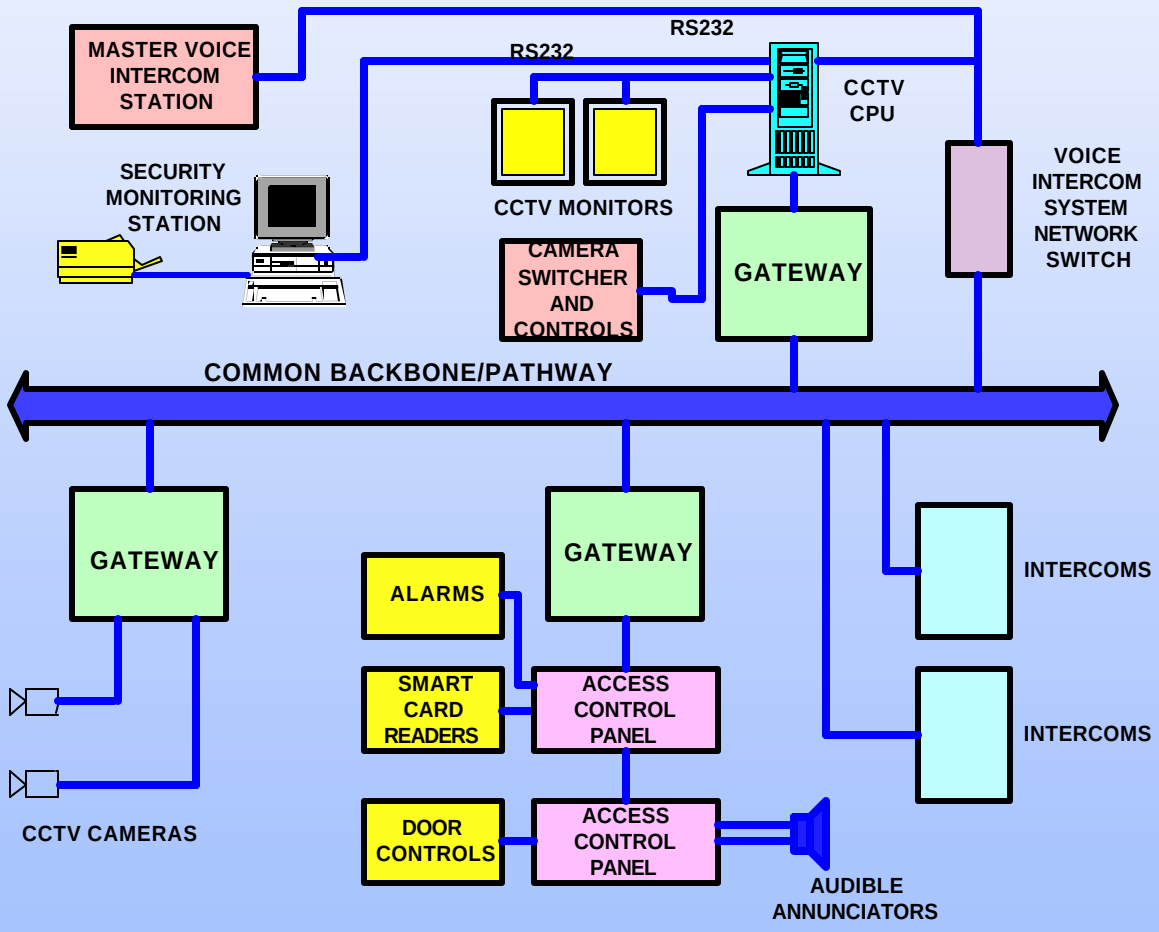
ILLUSTRATION OF A TYPICAL INTEGRATED SECURITY SYSTEM



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FUNCTIONS OF THE BUILDING ENERGY MANAGEMENT/AUTOMATION SYSTEM

- Monitoring and/or control
  - Air Distribution Systems
  - Chilled and Condenser Water Systems
  - Standby and Emergency Generators
  - Fuel Oil Systems
  - Lighting
  - Domestic Water, Sump Pumps, Sewage Systems, etc.
  - Other MEP Systems
- Optimization, Control & Reporting of Energy Use
- Indoor Air Quality Monitoring and Control
- Maintenance Management & Inventory Control
- Tenant Billings
- Monitoring of other Intelligent Building Systems
- Operations Monitoring and/or control Data Storage, Analysis & Reporting

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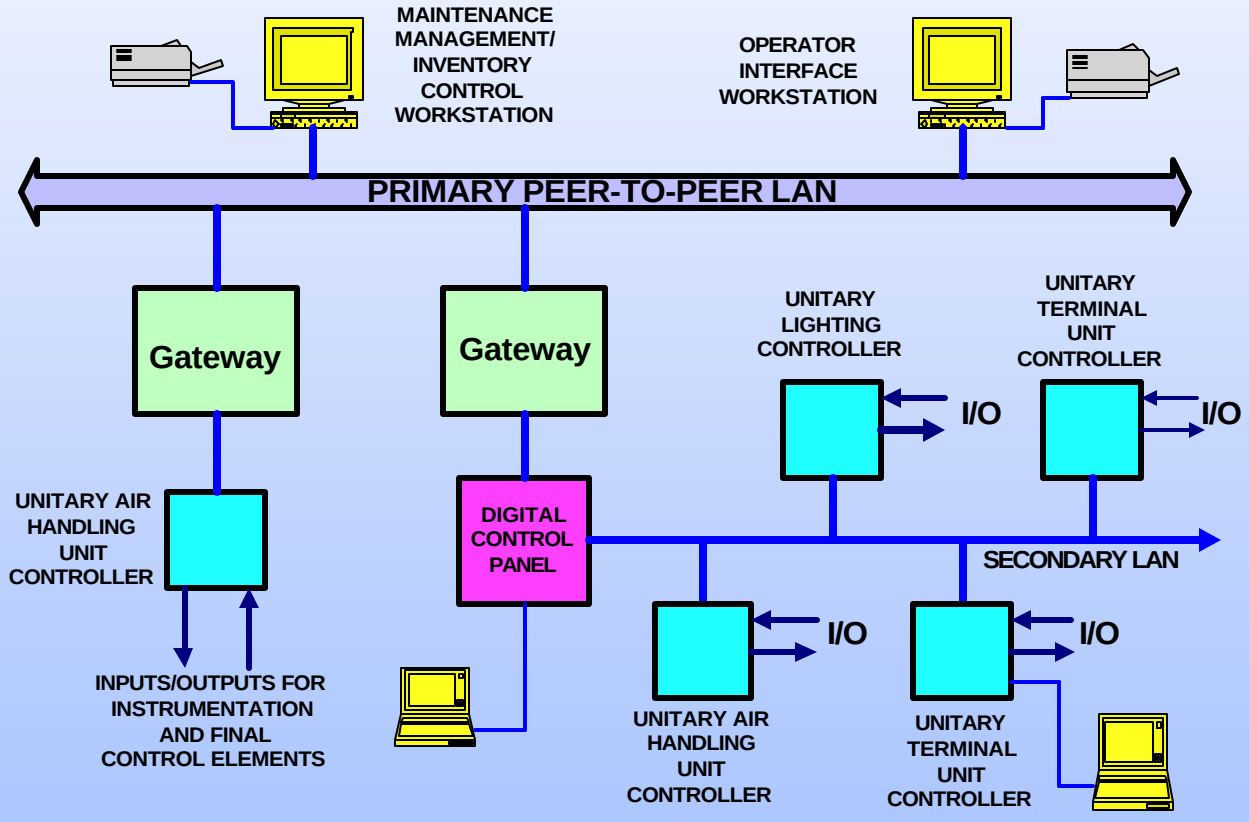
ILLUSTRATION OF A TYPICAL BUILDING ENERGY MANAGEMENT/AUTOMATION SYSTEM



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WHY INTERFACE/INTEGRATE IBS?

- Information available at one system can be used to affect the actions of another system to the benefit of the building and its occupants.
- A common Operator Interface (This applies only to software interfaces)
- Saves and reduces control room space.
- The activities of separate systems can be monitored from a single location and there is a single point for receiving alarms.
- Can reduce manpower requirements OR can allow manpower to perform additional tasks, such as increased maintenance of equipment, which have cost benefits.
- May have lower capital costs depending on the approach adopted toward the integration.
- Marketability.
- Flexibility - A standard protocol will enable a wide range of vendors to compete for expansions and replacement of components.

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SOME TYPICAL IBS INTERFACES

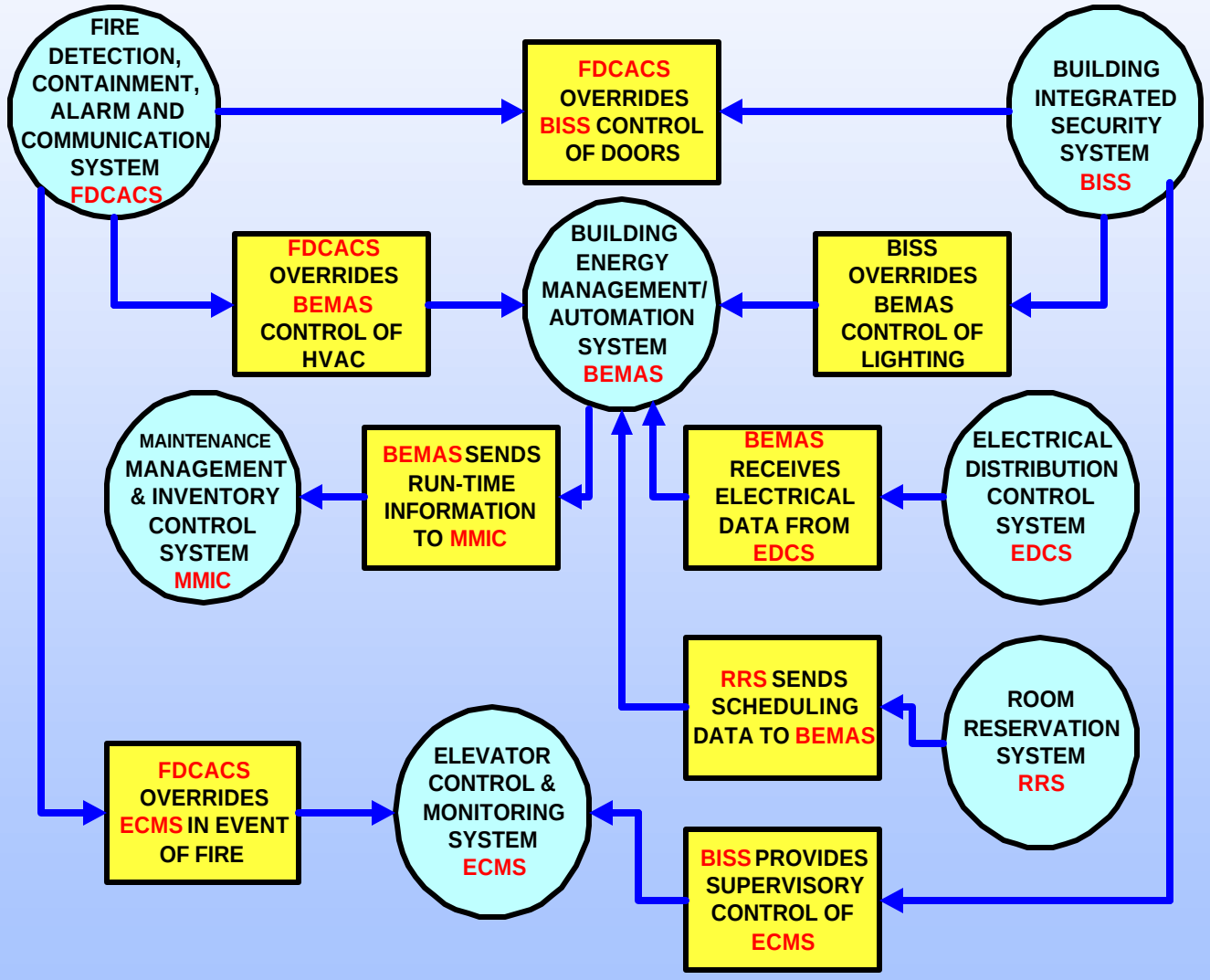

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ILLUSTRATION OF INFORMATION EXCHANGE BETWEEN THE DATA AND CONTROL NETWORKS

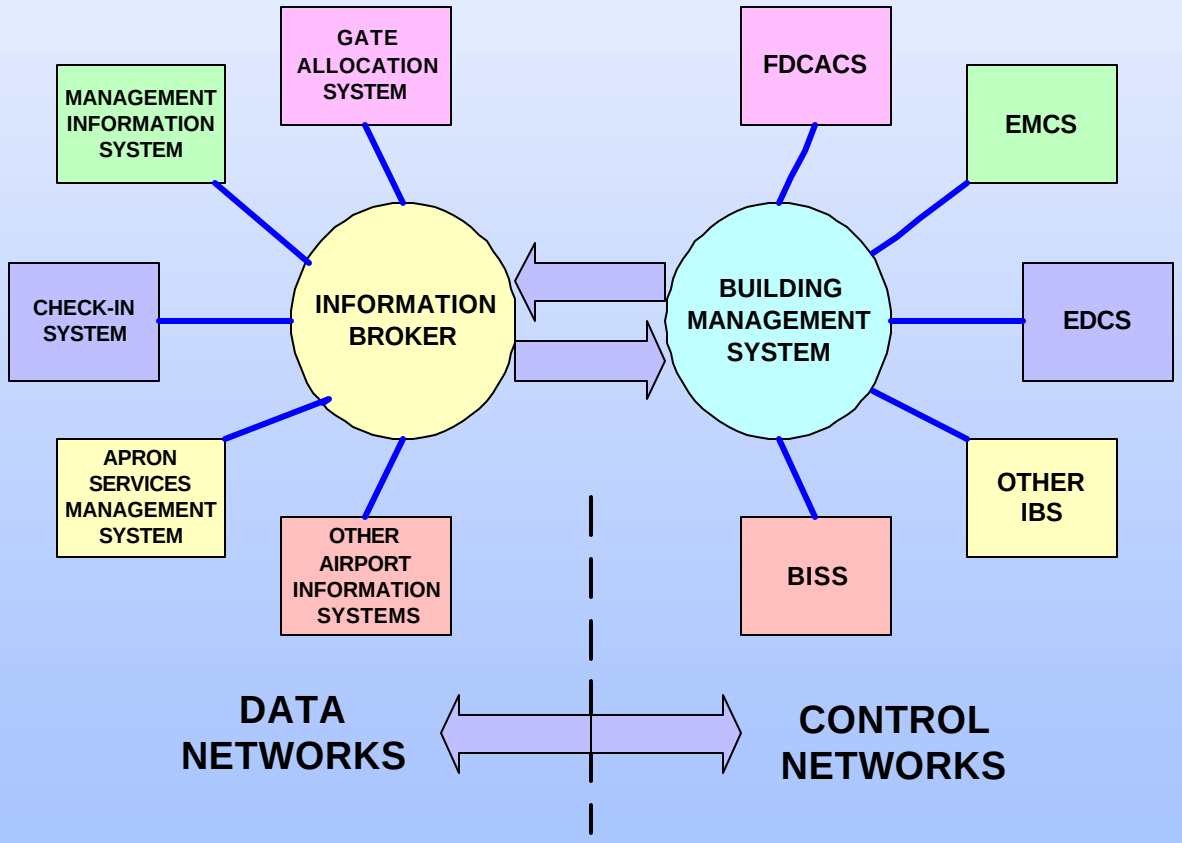

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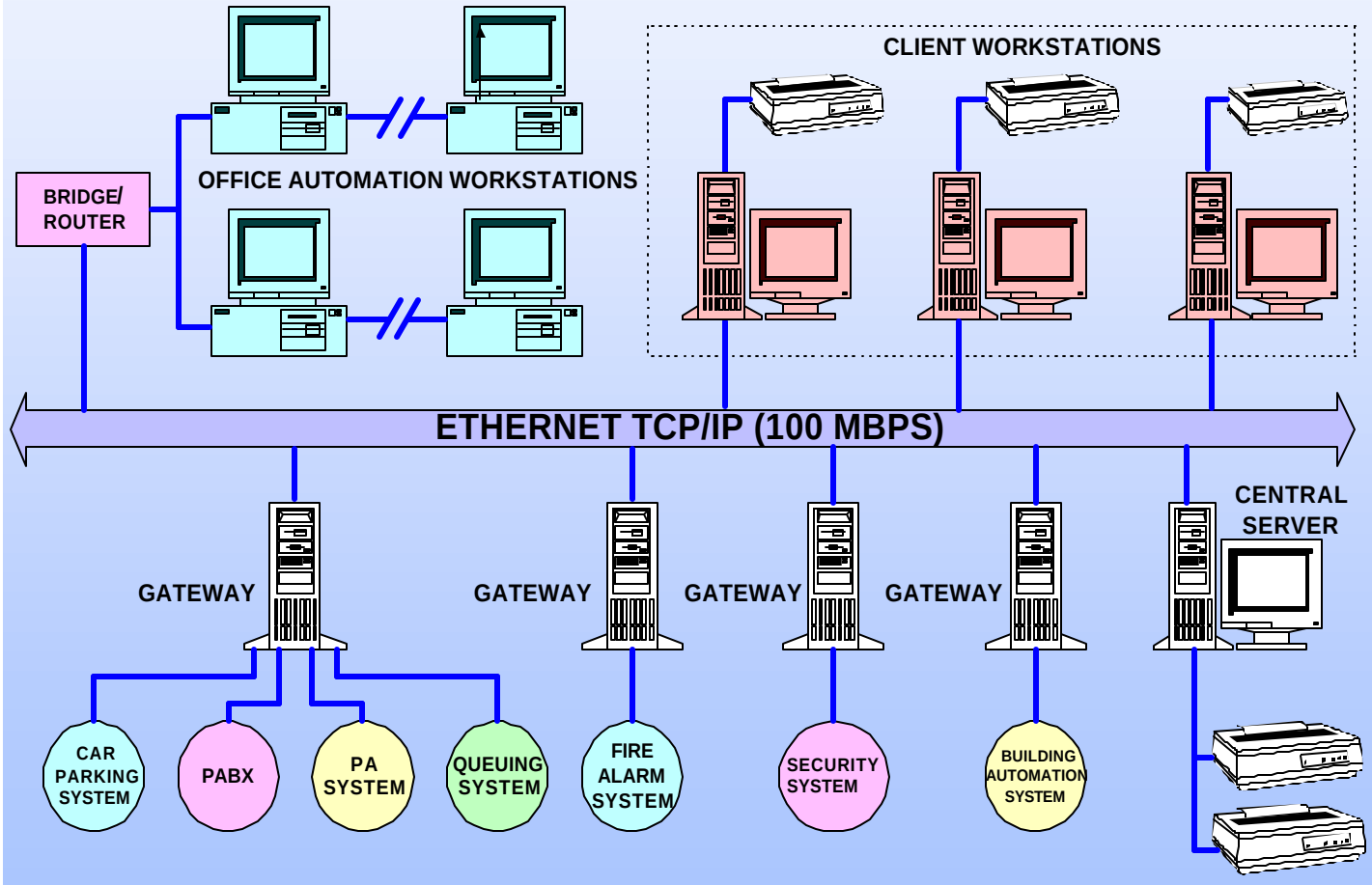
ILLUSTRATION OF A POSSIBLE INTEGRATED SYSTEMS ARCHITECTURE



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IBS RECENT ADVANCES

The following is a list of some of the advances in IBS that are not yet common but which have been successfully implemented:

- A Common Operator Interface serving all IBS.
- Interface between the Security System and the Building Energy Management/Automation System to initiate HVAC and Lighting control on the basis of a person's entry into and movements within the facility.
- Interface between the Security System and the Telephone System to route calls to the appropriate location based on a person's movements within the facility.
- Interface between the Building Energy Management/Automation System and the Office Automation System to enable building occupants to adjust the environmental conditions within their area from their desktop computer systems.
- An interface between the Security System and the Accounting Systems to enable an occupant using a "smart access card" to undertake a wide variety of tasks such as copying, sending faxes, obtaining meals in the cafeteria, etc. and to have the expenses allocated to the appropriate accounts.
- The use of Global Positioning Systems to monitor the location of personnel both inside and outside the facility.
- An interface between the CCTV system and the Office Automation System to enable, for example, a visitor at the lobby security desk to be observed on any desktop computer within the facility.
- An interface between the Building Energy Management/Automation System and the Valet car parking system.

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STEPS IN THE IBS INTEGRATION PROCESS

- Define the levels of integration required between the various systems.
- Determine what contracting approach will be used - will the systems integration consultant define the network protocol prior to IBS purchase or will the systems integration consultant define the network protocol following the award of contracts for the individual IBS?
- Define the interlocking sequences of operation and determine whether the implementation becomes the responsibility of the systems integrator or the IBS vendors.
- Define the general requirements for the common operator interface.
- Obtain software protocols from the applicable IBS manufacturers.
- Develop software drivers for each IBS. Depending on the contracting approach, this is the responsibility of the IBS vendors or the systems integrator.
- Test software drivers.
- Develop operator interface screens and I/O point definitions.
- Undertake acceptance testing of the integration and the operator screens.
- Install integration components, software and hardware, on site and check network.
- Commission and test the software and the I/O interface on the installed screen.
- Undertake final acceptance testing.

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