



A Multidisciplinary Approach to Curriculum Development in Sustainable Built Environment

Sustainable Built Environment

Chapter 5: Intelligent Building



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5.1 Introduction

5.1.1 Intelligent Building

1.The development of Intelligent Building

- ✧ IB was firstly advocated by UTBS Corporation in the U.S.A. in 1981.
- ✧ It became a reality in July, 1983 with the inauguration of the City Place Building in Hartford, Connecticut, U.S.A.

2.The definition of intelligent building

- ✧ IB is one which provides a productive and cost-effective environment through optimization of its four basic elements, i.e. structure, systems, services and management and the interrelationships between them.

-----the Intelligent Building Institute (I.B.I.)

3.The Japanese foci of IB have been on four aspects:

- ✧ Serving as a locus for receiving and transmitting information and supporting management efficiency.
- ✧ Ensuring satisfaction and convenience for the people working in them.
- ✧ The rationalization of building administration to provide more attentive administrative services with lower cost.
- ✧ Fast, flexible and economical responses to changing sociological environments, diverse and complicated office work and active business strategies.

4. The components of intelligent building

- ✧ Communication Automation System (CAS)
- ✧ Office Automation System (OAS)
- ✧ Security Automation System (SAS)
- ✧ Fire Automation System (FPS)
- ✧ Generic Cabling System (GCS)

5.1.2 Intelligent building and sustainable development

1.Reduced Resource Consumption;

2.Optimized Convenience and More Comfort.

5.2 Common applications of BAS

5.2.1 Building Automation Systems (BAS)

✧ The Signification of BAS

Integrated the computer and automation control technology to Building Automation Systems (BAS) control and optimize the performance of building services systems (HVAC equipment, lighting systems, water supply and drainage systems, transportation systems, and alarm systems).

✧ Common applications of BAS

- (1) Equipment scheduling (turning equipment off and on as required)
- (2) Optimum start/stop (turning heating and cooling equipment on in advance to ensure the building is at the required temperature during occupancy)

- (3) Operator adjustment (accessing operator set-points that tune system to changing conditions)

- (4) Monitoring (logging of temperature, energy use, equipment start times, operator logon, etc)

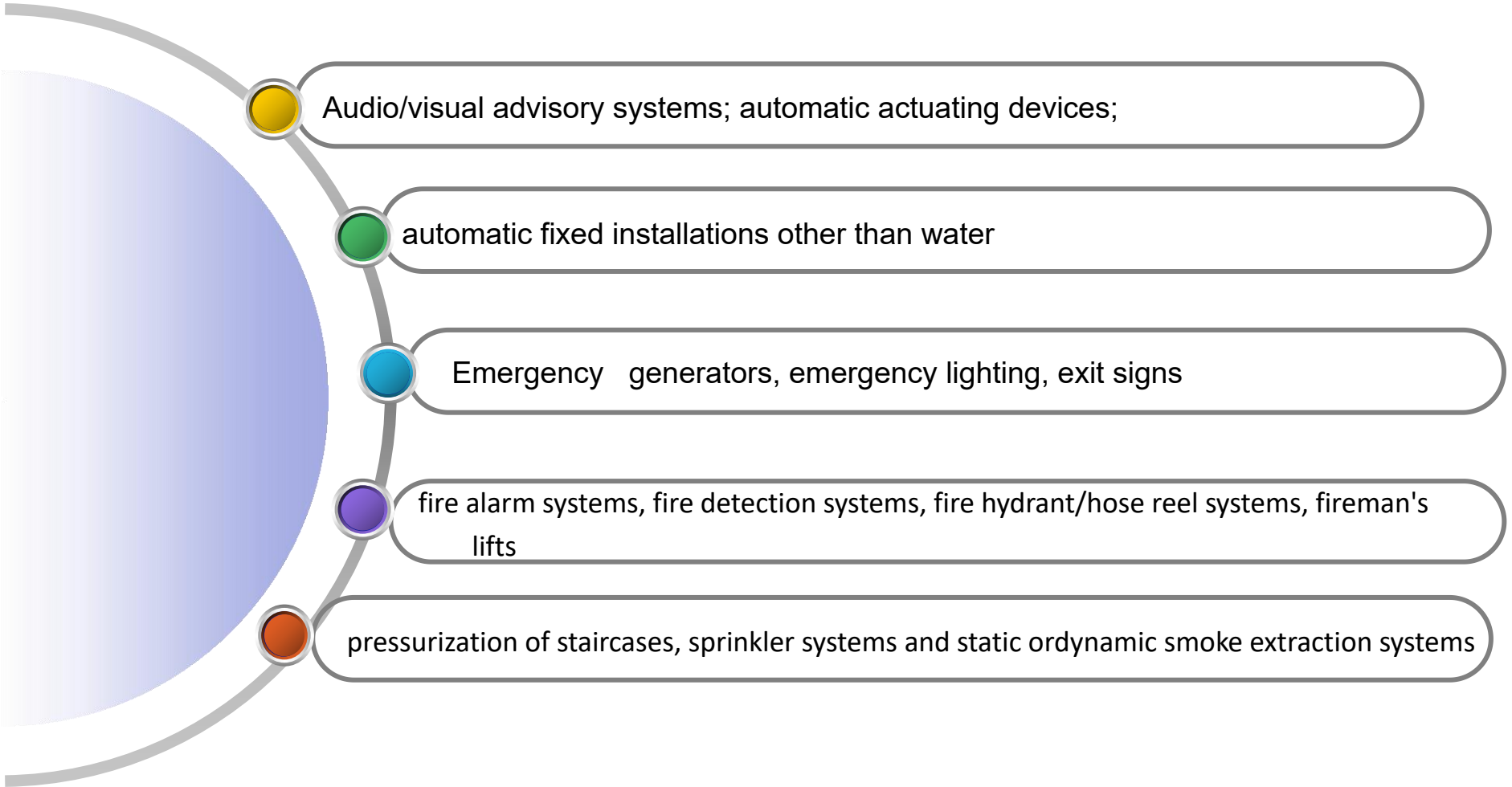
- (5) Alarm reporting (notifying the operator of failed equipment, out of limit temperature/pressure conditions or need for maintenance)

5.2.2 Fire Automation System

✧ Introduction

✧ Fire Automation System

Devices of Fire Automation System



Audio/visual advisory systems; automatic actuating devices;

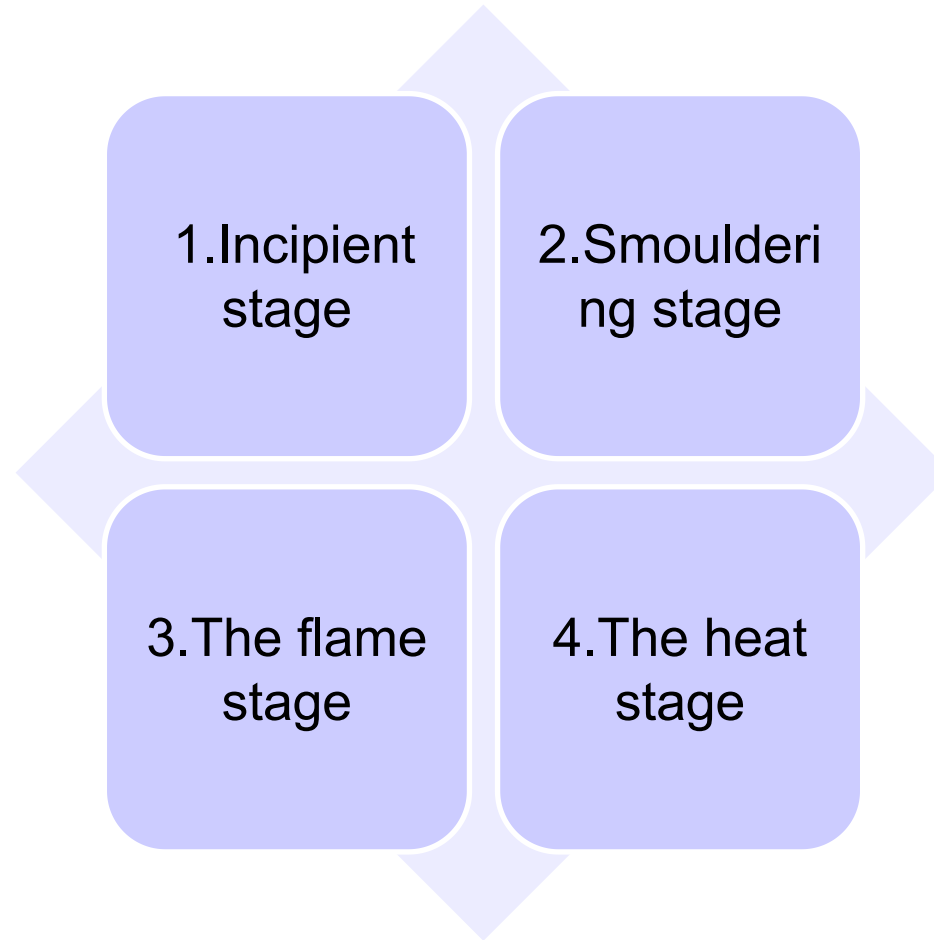
automatic fixed installations other than water

Emergency generators, emergency lighting, exit signs

fire alarm systems, fire detection systems, fire hydrant/hose reel systems, fireman's lifts

pressurization of staircases, sprinkler systems and static ordynamic smoke extraction systems

Four stages of fire development



Foam Systems

Fixed foam systems are similar in operation to deluge sprinkler systems, except the systems discharge foam instead of water.

Their main applications are to fight liquid fires or to protect valuable equipment, such as aircrafts in their hangars for maintenance.

The most commonly used in buildings being the high expansion form system.

5.2.3 automatic safety system

✧ Introduction

✧ Sensors and Space Sensors

Sensors and Space Sensors

Fence connected systems include coaxial sensor cables, tilt switches, taut wire sensors and electric field sensors.

Microwave sensors use a modulated transmitter and receiver that can provide protection beams up to 150 m long.

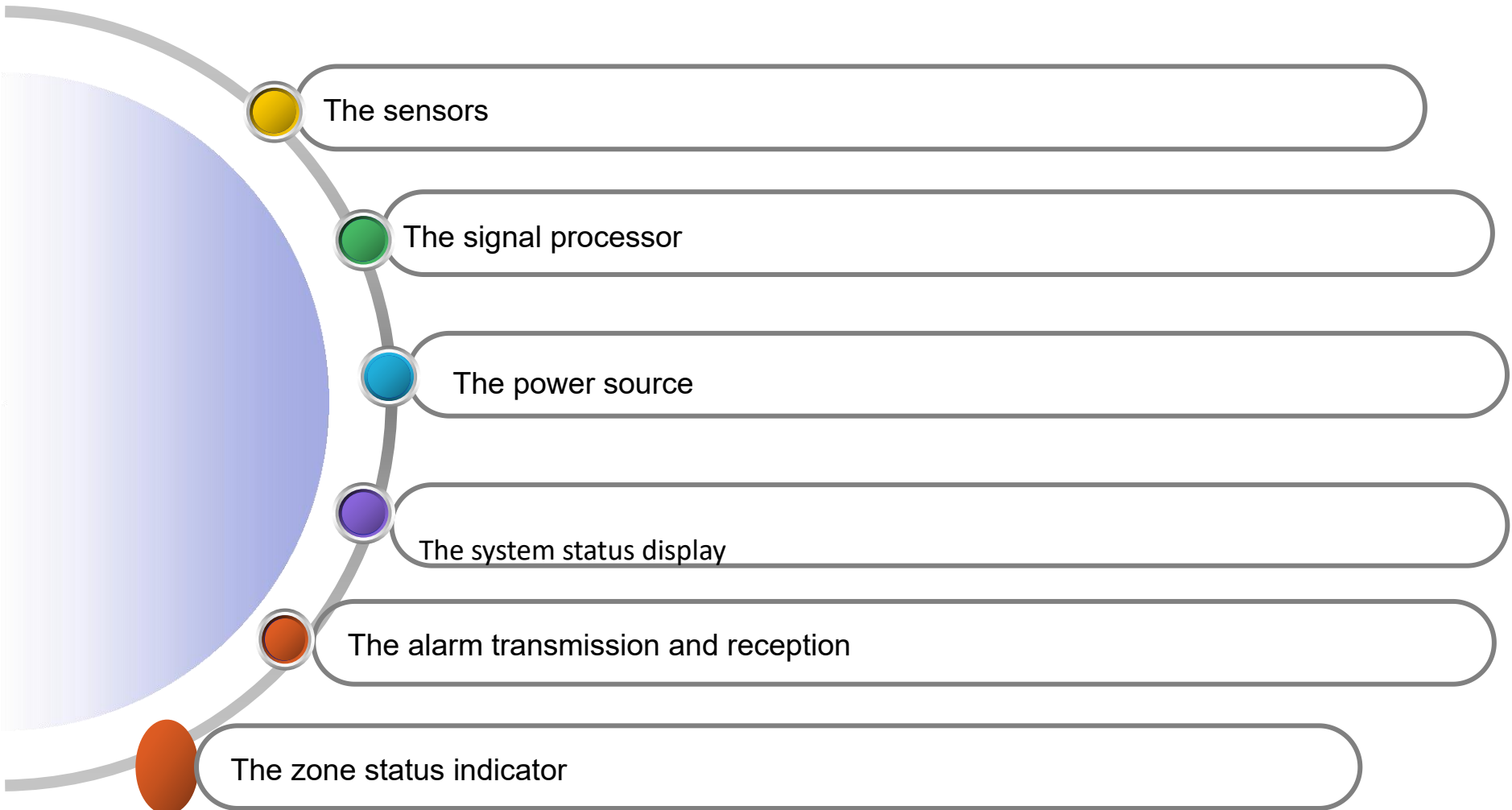
A moving object is detected when a change in the net vector sum of the received signal causes variation in the signal strength. etc..

Closed Circuit Television Systems (CCTV)

A CCTV system has a direct link between a camera and a viewing monitor and the CCTV picture signal is not transmitted in free space for reception by others.

A number of monitors can be run from one camera

The components of Central Alarm Systems



5.2.4 Office Automation System (OAS)

- ✧ The signification of OAS

The signification of OAS

Office Automation System (OAS) is configurations of networked computer hardware and software.

A variety of office automation system are now applied to business and communication functions that used to be performed manually or in multiple locations of a company, such as preparing written communications and strategic planning.

✧ Main functions of OAS

- (1) Electronic publishing;
- (2) Electronic communication;
- (3) Electronic collaboration;
- (4) Image processing;
- (5) Office management.

Main functions of OAS

Electronic publishing

Electronic communication

Electronic collaboration


Image processing

Office management

5.2.5 Communication Automation System



- Telephone System

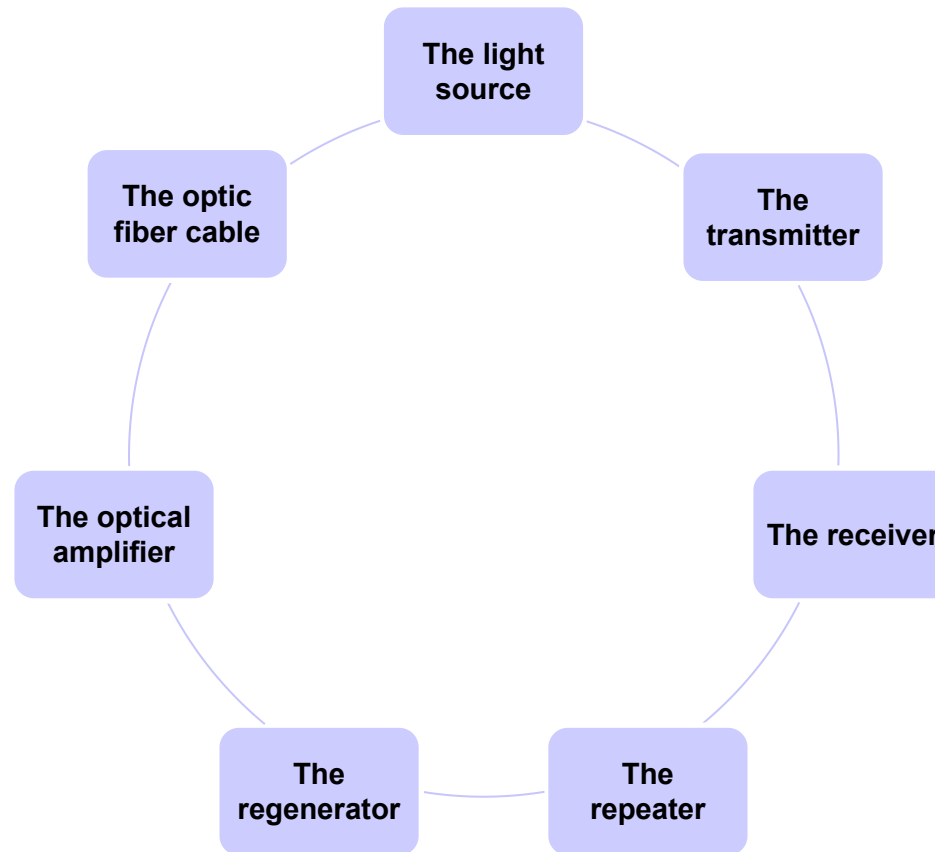


- Communal Aerial Broadcasting

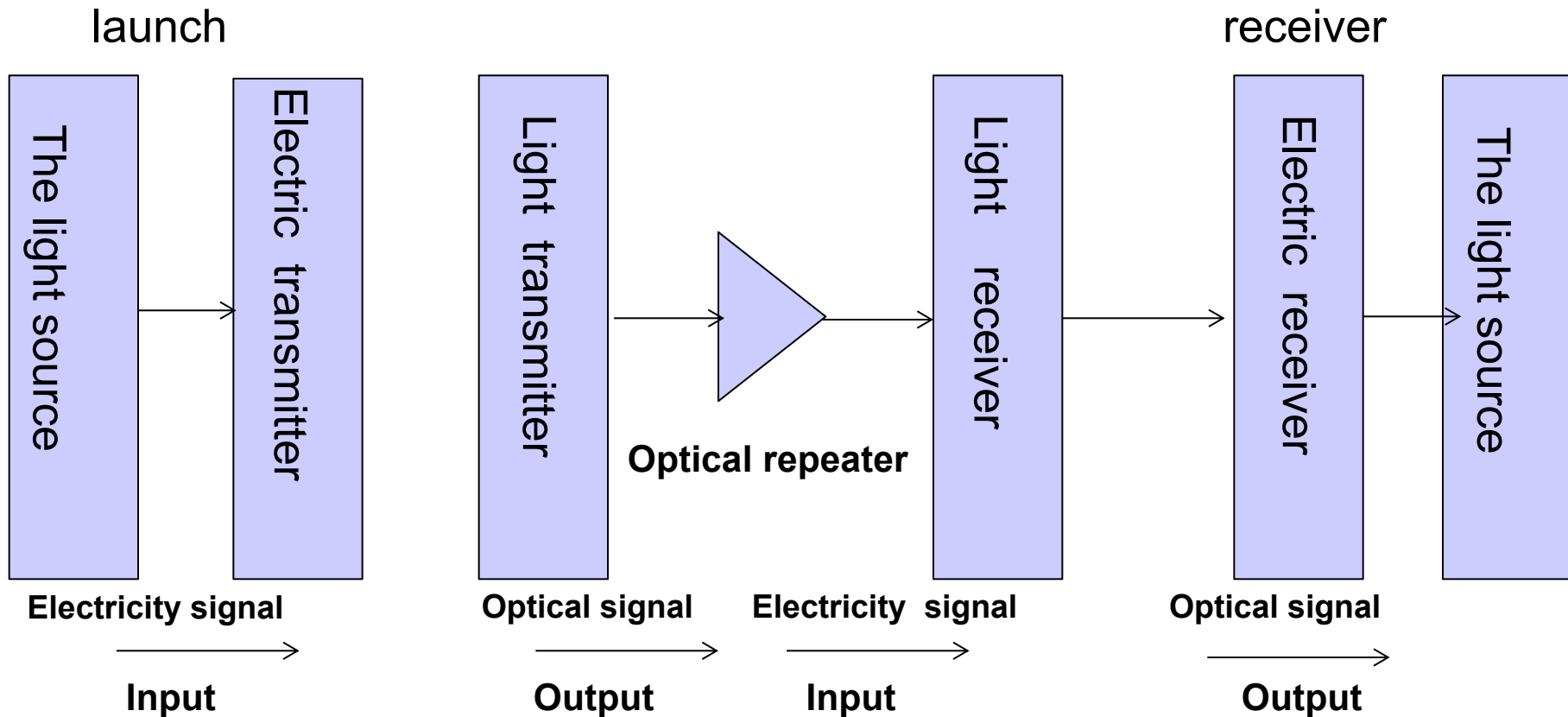


- Satellite Communication

✧ The components of Fiber Optic System

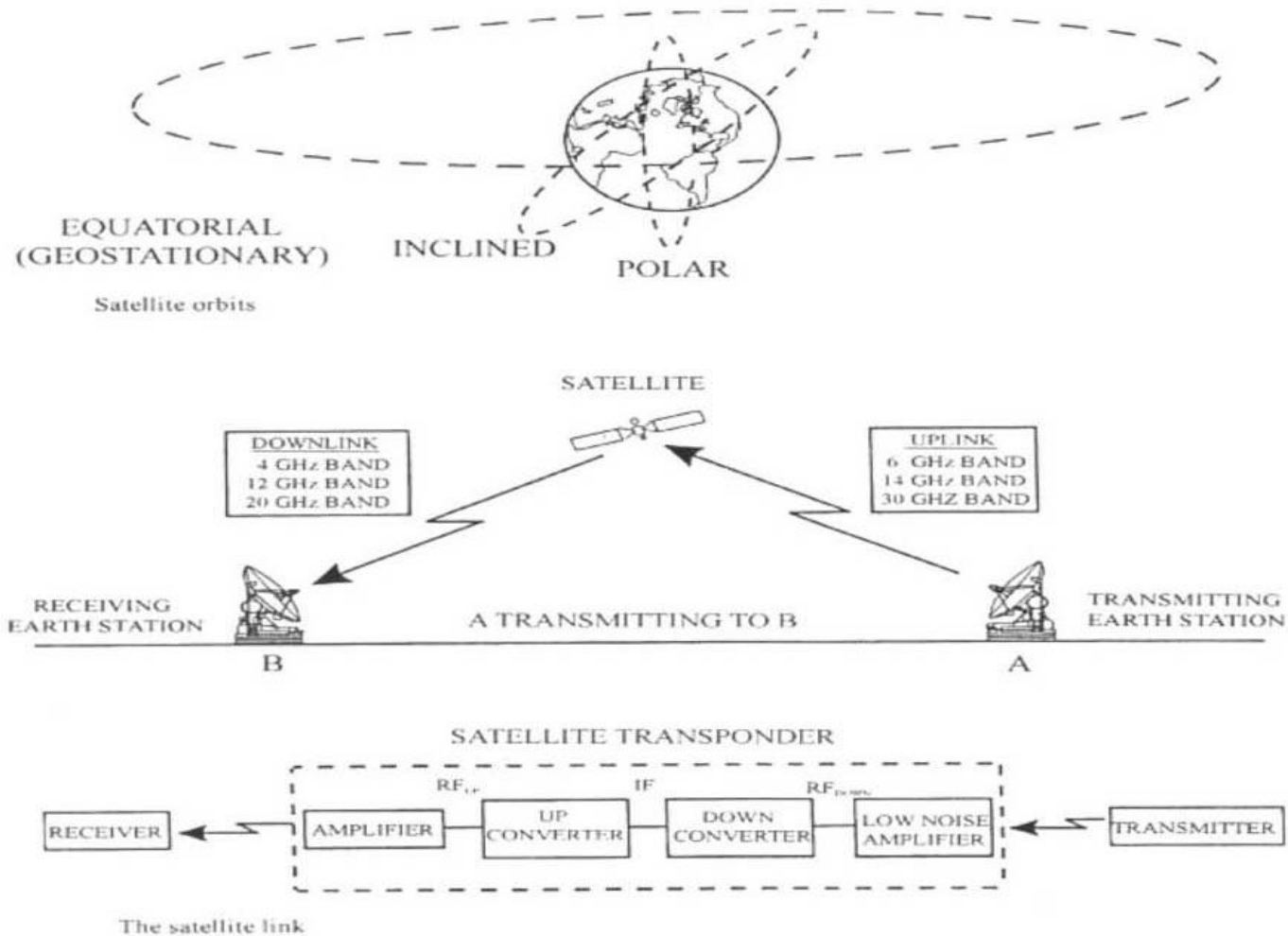


✧ The principle of Fiber Optic System



Name	Data Rate	Number of Voice
DS-0	64 kbps	1
DS-1 (T1)	1.544 Mbps	24
DS-1 (T2)	6.35 Mbps	96
DS-3 (T3)	44.736 Mbps	672
DS-4 (T4)	274.176 Mbps	4032
DS-5 (T5)	560.16 Mbps	80664

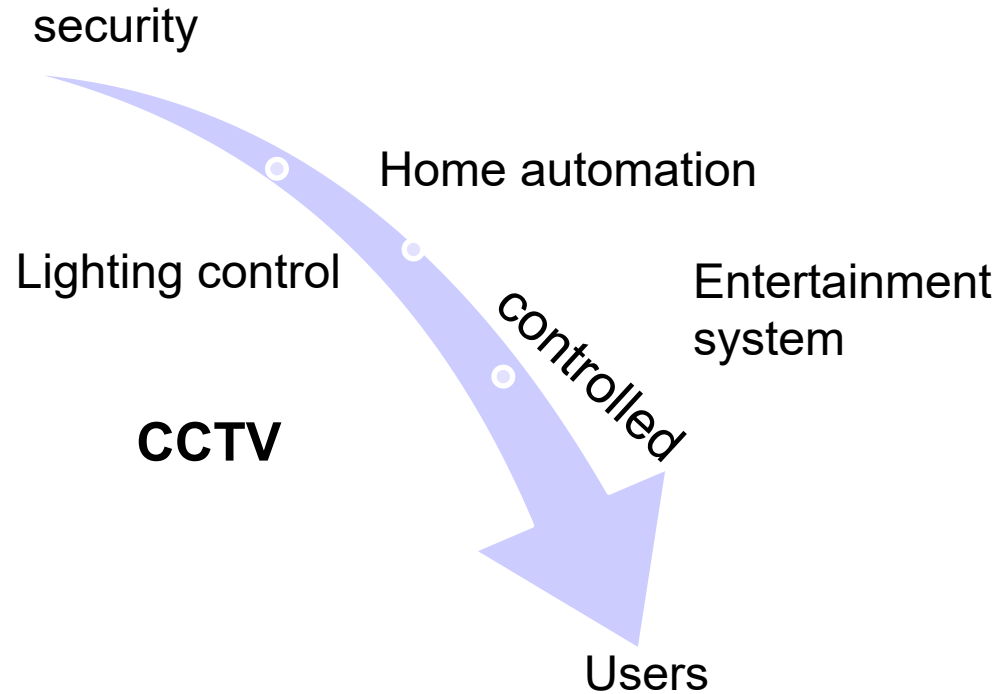
Standard telecommunication rates

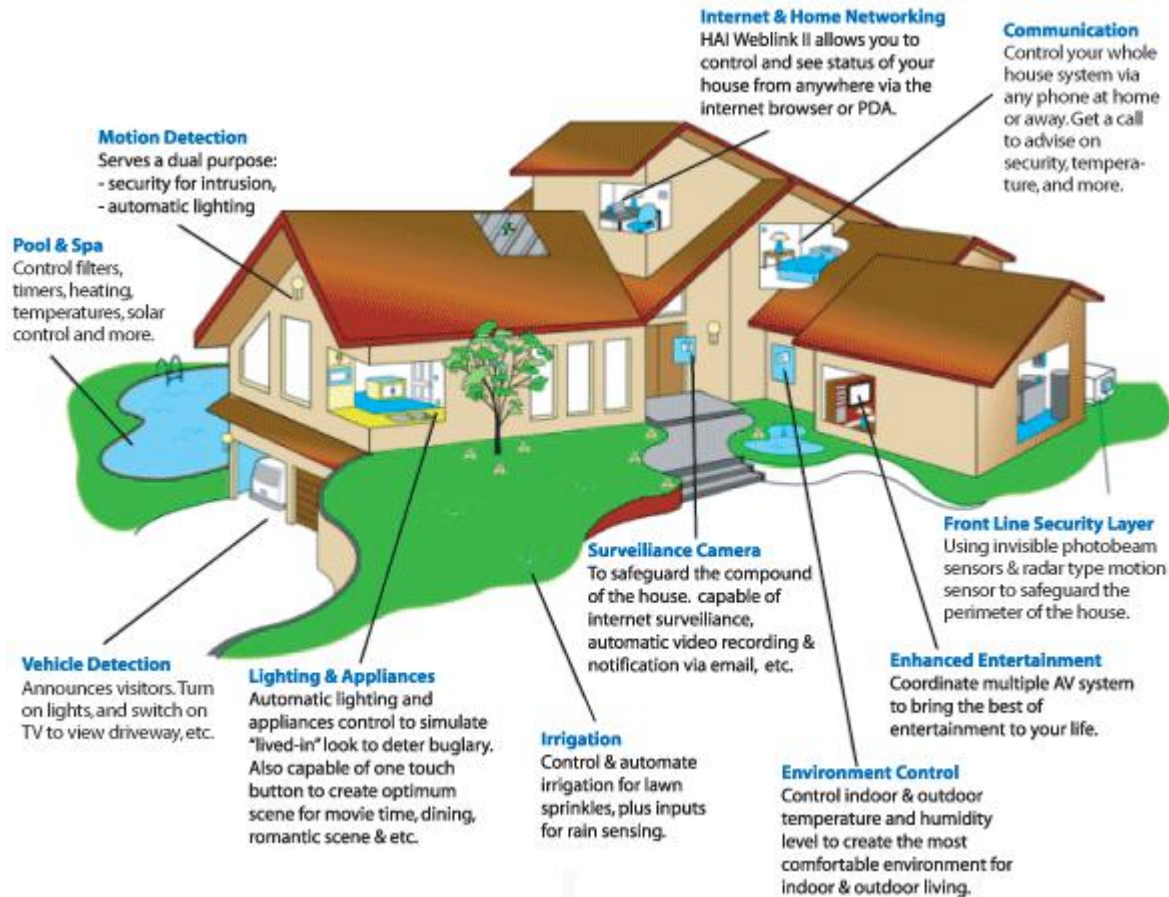


The Principle of Satellite Communication

5.2.6 Smart Home Systems

Smart Home is an integration of various systems at home which is coordinated by a smart home controller and controlled by users using various centralized command interfaces





The components of Smart Home System

✧ The benefits of Smart Home System

1

- Intelligent Security

2

- Convenient

3

- Comfortable & Fun

5.3 Control of Building service system

12.3.1 HVAC&R system

12.3.2 Lighting system

12.3.3 Transportation system