**Technology Systems and Evolution of Intelligent Buildings**

* Integrated single function/dedicated systems (1980–5);
* Integrated multifunction systems (1985–90);
* Building level integrated systems (1990–5);
* Computer integrated building (1995–2002);
* Enterprise network integrated systems (2002–).

At the stage of ***integrated single function/dedicated systems*** (1980–5), all the BA subsystems (including security control; access control; heating, ventilation and air- conditioning [HVAC] control; lighting control; lift control; other electrical systems; fire automation; etc.) and CA subsystems (including electronic data processing [EDP]) and data communication; telefax and text communication; voice communication; TV and image communication; etc.) were integrated at the level of a single or individual function subsystem.Integration and communication between the automation systems of different subsystems was impossible.

At the stage of ***integrated multifunction systems*** (1985–90), security and access control were integrated. The automation systems of building plants or services systems were integrated. There were unified networks for text and data communication, voice communication and image communication respectively. At this stage, the integration of systems with the same nature or similar functions was achieved.

At the stage of ***building level integrated systems*** (1990–5), both BA and communication systems were integrated at building level as building automation system (BAS) and integrated communication system (ICS). At this stage, a BA system could be accessed remotely via telephone network using a modem, while the cellular phone for voice and data communication was introduced to the market.

At and after the stage of ***computer integrated building*** (1995–2002), convergence networks became available and were used in practice progressively, thanks to the popular use of Internet protocol (IP) network technologies and increased network capacity. At this stage, the integration was at the building level. Remote monitoring and control could be achieved via the Internet.

At the stage of ***enterprise network integrated system*** (2002–), the intelligent systems can be integrated and managed at enterprise level or city level.

Intelligent building systems are not enclosed within buildings any more; they are merged with IB systems in other buildings as well as other information systems via the global Internet infrastructure. Integration and management at this level become possible due to the applications of advanced IT technologies such as Web Services, XML, remote portfolio management and helpdesk management, among others. In terms of communication, image communication via cellular phone has been brought into practical use.

**References:**

Shengwei Wang, Intelligent Buildings and Building Automation, 2010.