SUMMARY

BACnet is a data communication protocol for building automation and control networks developed by the American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE). BACnet is currently an American national standard and a European pre-standard. The current version of the BACnet protocol, ANSI/ASHRAE Standard 135-1995, is specifically tailored to meet the needs of the heating, refrigerating, and air-conditioning industry. But it is also the intention of the BACnet protocol designers to allow BACnet to evolve into a common communication protocol suite which makes system integration easier and allows interoperability among equipment from different vendors. The end objective is to have a single, cohesive system that can be competitively implemented.

This requirement of seamless system integration and interoperability is also essential in Intelligent Buildings. Without the implementation of such requirement, there may be doubts over how Intelligent Buildings can provide a productive and cost-effective environment for their occupants.

Not specified in the current Standard are the guidelines which building designers can make use of for interfacing with other building control systems such as lighting, security, fire protection etc. Among all the shortcomings is the non-availability of the guidelines to store and transmit still images or motion video pictures.

The development of the complete range of extensions of BACnet for all possible subsystems in Intelligent Buildings is beyond the scope of a MSc (Building Science) dissertation. The primary objective of this dissertation work is to develop a BACnet protocol stack which is capable of facilitating video storage and transmission for Intelligent Buildings.

* BACnet is an acronym for Building Automation and Control Network.
* ANSI denotes American National Standards Institute.
Apart from the protocol stack proper, the issue of choice of suitable video compression algorithms in handling of video and the associated Application Program Interfaces (APIs) are also addressed.

Video compression is necessary because it would help to reduce channel bandwidth, storage space and overall network response times. It is also concluded that while there is no difficulty in accommodating still image captures, handling of real-time video is not yet possible through BACnet. At best, motion video playback could be allowed. Hence, the Problem arisen is reduced to addressing the issue of storing and transmitting large image and video files.

After deliberation, the Joint Photographic Experts Group (JPEG) algorithm is recommended for still image and Motion Picture Experts Group (MPEG) compression is suggested for motion video playback.

The adoption of the right type of APIs is equally important as this would help to ease software/firmware programming and make integration easier. Socket APIs are chosen as these are readily available for various computer operating systems.

The whole treatment of specifying the video File Object, Services as well as the associated Protocol Data Units (PDU's) for the proposed protocol stack may not be exhaustive but substantial. The proof of concept of applying the User Datagram Protocol/Internet Protocol (UDP/IP) suite as part of the proposed BACnet video protocol stack is successfully illustrated through a client/server personal computer setup.

Lastly, the author also put forward some suggestions for further research which are related to handling of real-time video and possible improvements to the proposed BACnet video protocol stack.