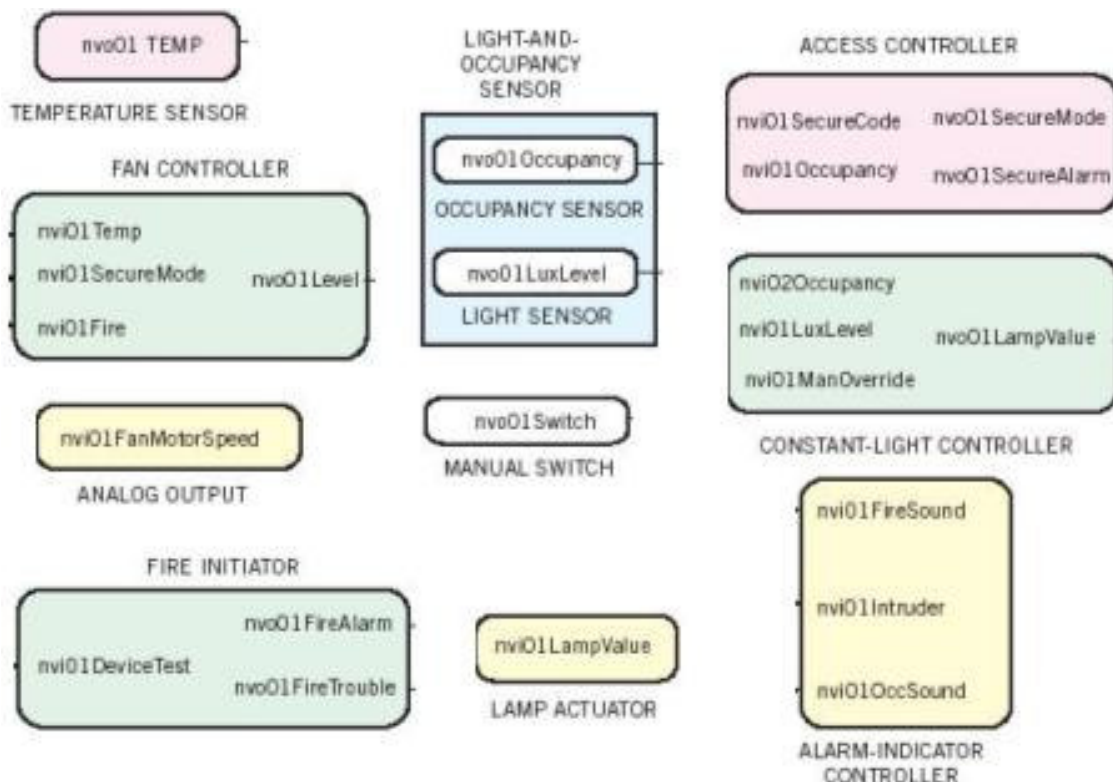


## Tutorial 7: Subsystems Integration

Q9. Use the following LonMARK devices' functional blocks to create links among them to complete the following control network design requirement:

- Whenever occupancy is detected, lamp will dim up or down according to the surrounding lux level, and the lamp control can be override by the manual switch.
- Whenever occupancy is detected, security code must be key in correctly
  - before the fan can be turn on according to the temperature setpoint
  - otherwise the intermittent beep-beep sound will be change to long beep to indicate intruder is detected.
  - To enable the fire testing mode.
- No matter in occupied or unoccupied mode, fire detection will initiate a loud long beeping sound and turn off the fan.

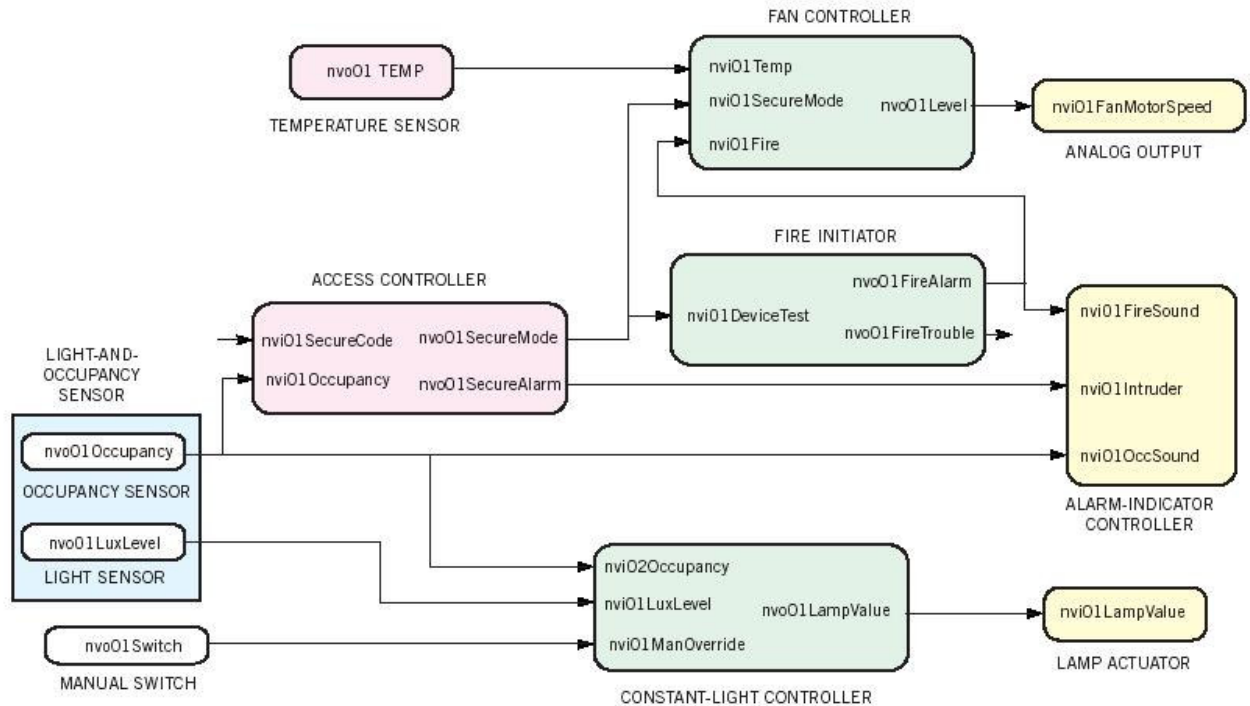


Q10.

- BACnet and LonMark devices have a similar approach in data structures but their implementations to ensure interoperability in systems integration are quite different. Briefly describe how BACnet and LonMARK implement such interoperability.
- Write a well formed XML file with your own tags to configure a Controller with two points containing the following information:
  - Point 1 – air duct temperature, in degree Celsius, location in main lobby
  - Point 2 – supply air damper position, ON or OFF state, location in room A
 \*\*Start your file with `<Controller>`, and end with `</Controller>`.

## Solution Guide

Q9:



Q10:

(a) BACnet implementation is by specifying BACnet objects make up of mandatory properties, optional properties, and vendor specific properties. BACnet services defined to manipulate these BACnet objects, such as ObjectAccess services, which can Read/Write the properties inside BACnet objects.

LonMARK implementation is by specifying LonMark objects make up of SNVTs and SCPTs (and UNVT, UCPT when needed, but vendors has to clearly state how they can be used). To ensure functional interoperability, LonMark objects are grouped together to create different functional profiles, such as Roof Top Controller functional profile.

- (b) <Controller>  
 <Point1>  
 <name>air duct temperature</name>  
 <unit>degrees C</unit>  
 <location>main lobby</location>  
 </Point1>  
 <Point2>  
 <name> supply air damper position </name>  
 < unit >state</unit >  
 <location>room A</location>  
 </Point2>  
 </Controller>