SOFTWARE ENGINEERING

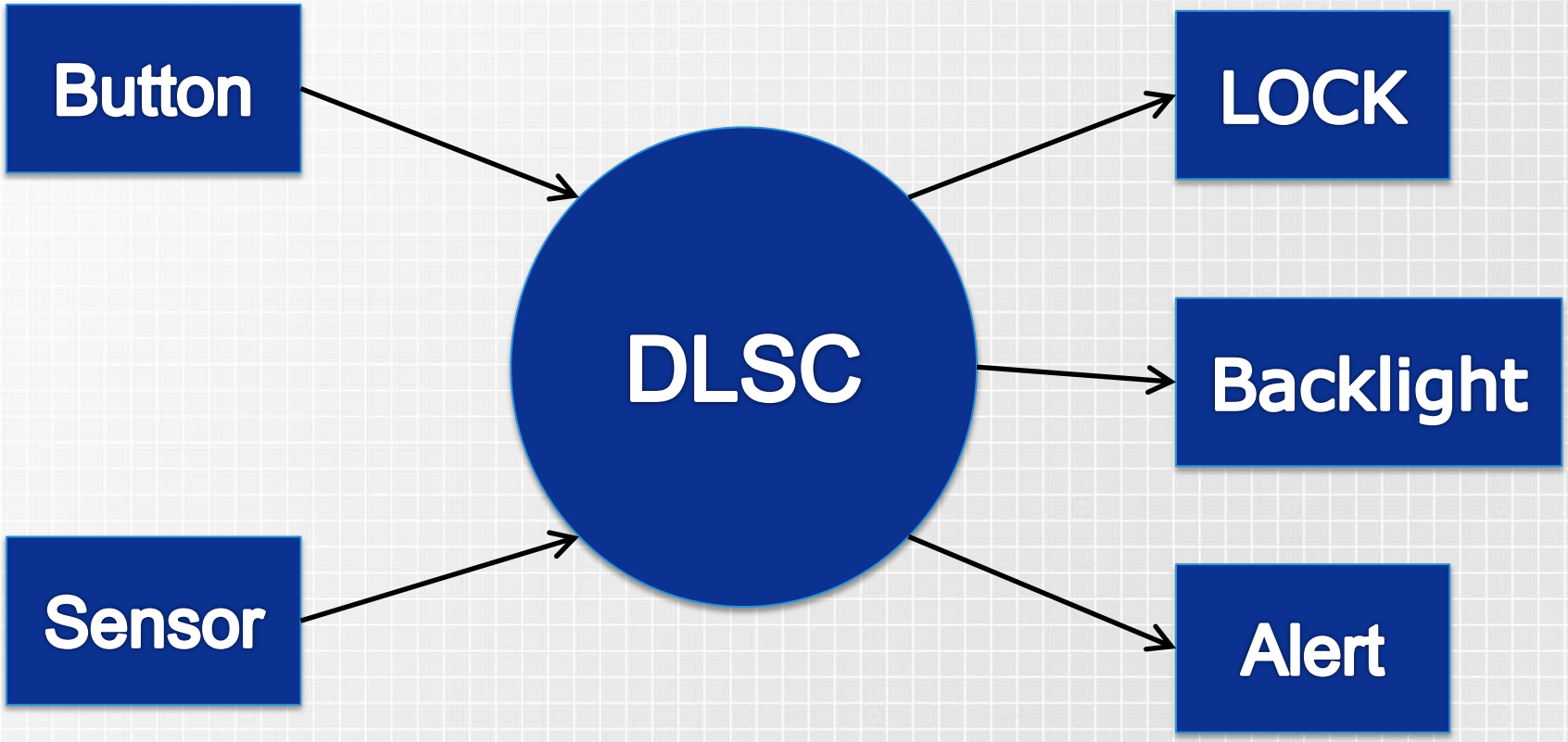
Practice #1 (SA) – Door Lock

DFD LEVEL 3

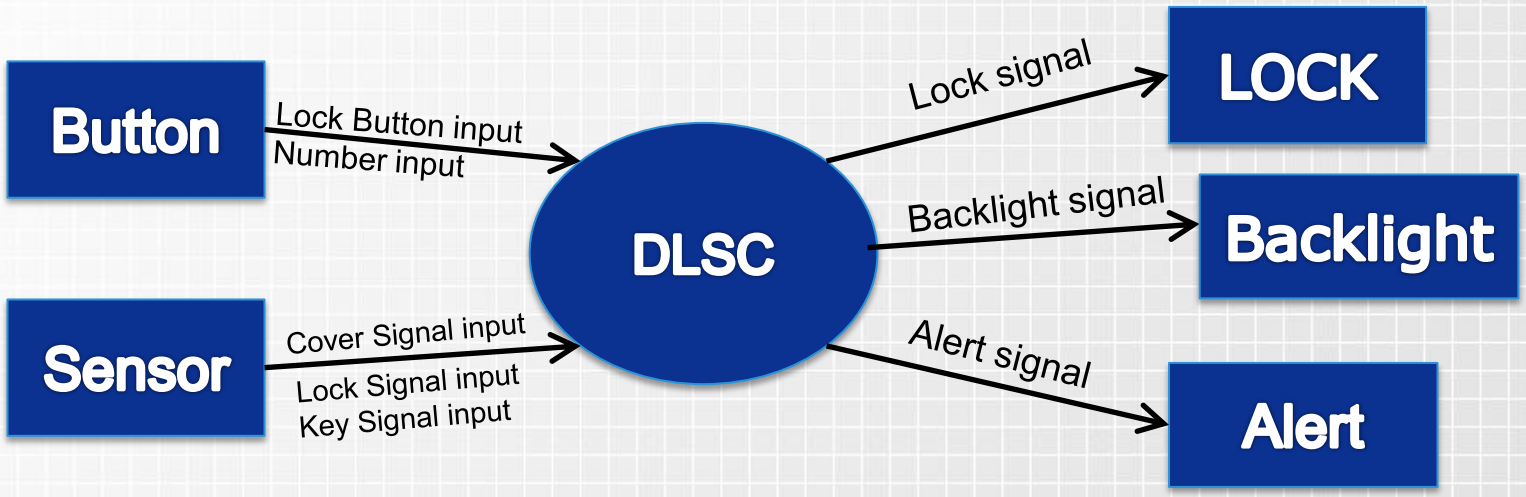
State Transition Diagram for backlight controller 2.2.1

201114188 김종연
201114191 정재욱
201114192 정재철
201114195 홍호탁

System Context Diagram

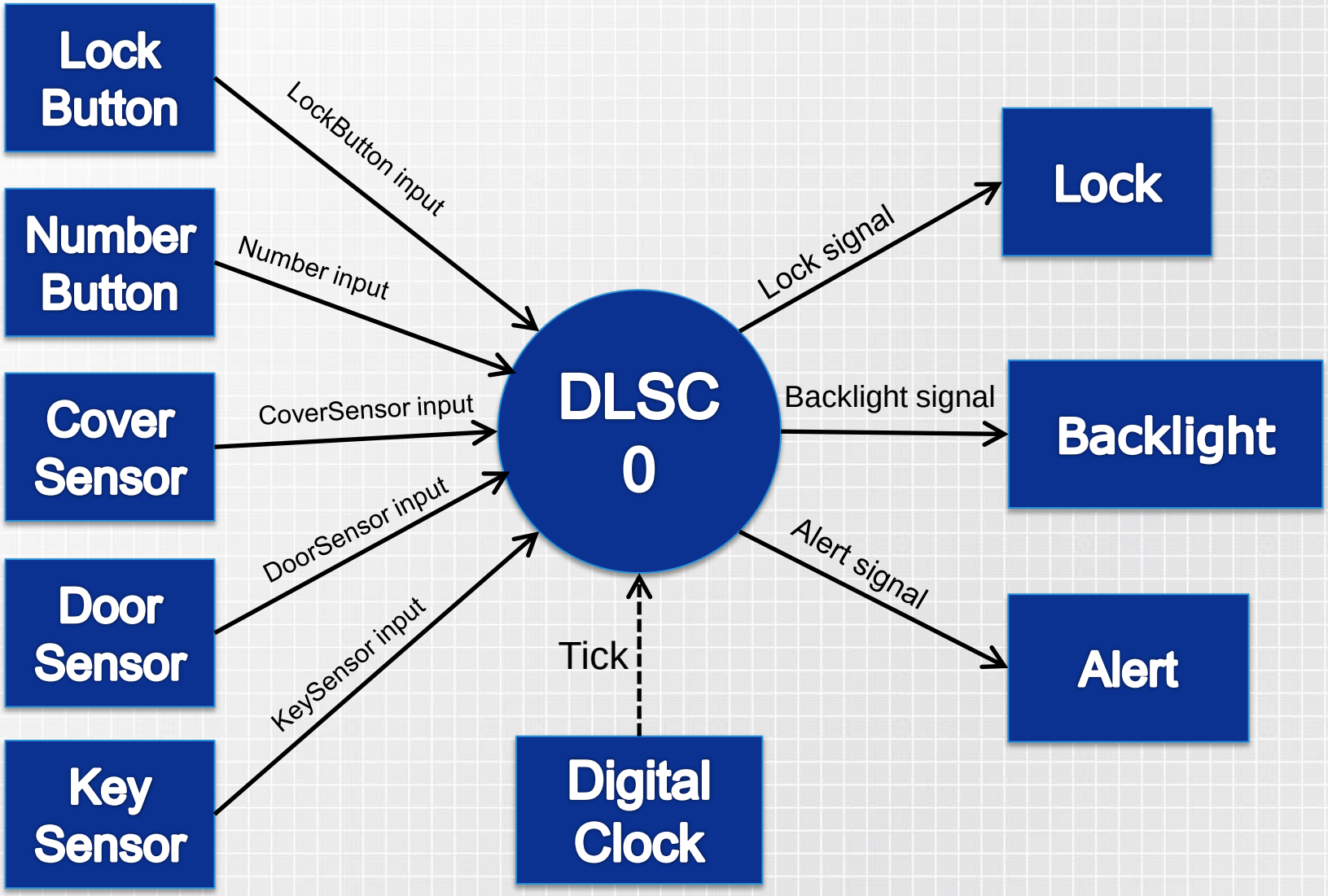


System Context Diagram - Event List



Input/Output Event	Description
Lock Button input	문을 수동으로 열고 닫을 수 있다.
Number input	숫자를 입력 받는다.
Cover Sensor input	숫자를 누를 수 있게 덮개를 열고 닫는다.
Door Sensor input	문의 상태를 확인한다.
Key Sensor input	열쇠 입력을 확인한다.
Lock signal	Open/Close
Backlight signal	On/Off
Alert signal	Alert1, Alert2, Alert3

DFD LEVEL 0


Lock Button
Number Button
Cover Sensor
Door Sensor
Key Sensor
LockButton input
Number input
CoverSensor input
DoorSensor input
KeySensor input
DLSC 0
Tick
Digital Clock
Lock signal
Backlight signal
Alert signal
Lock
Backlight
Alert

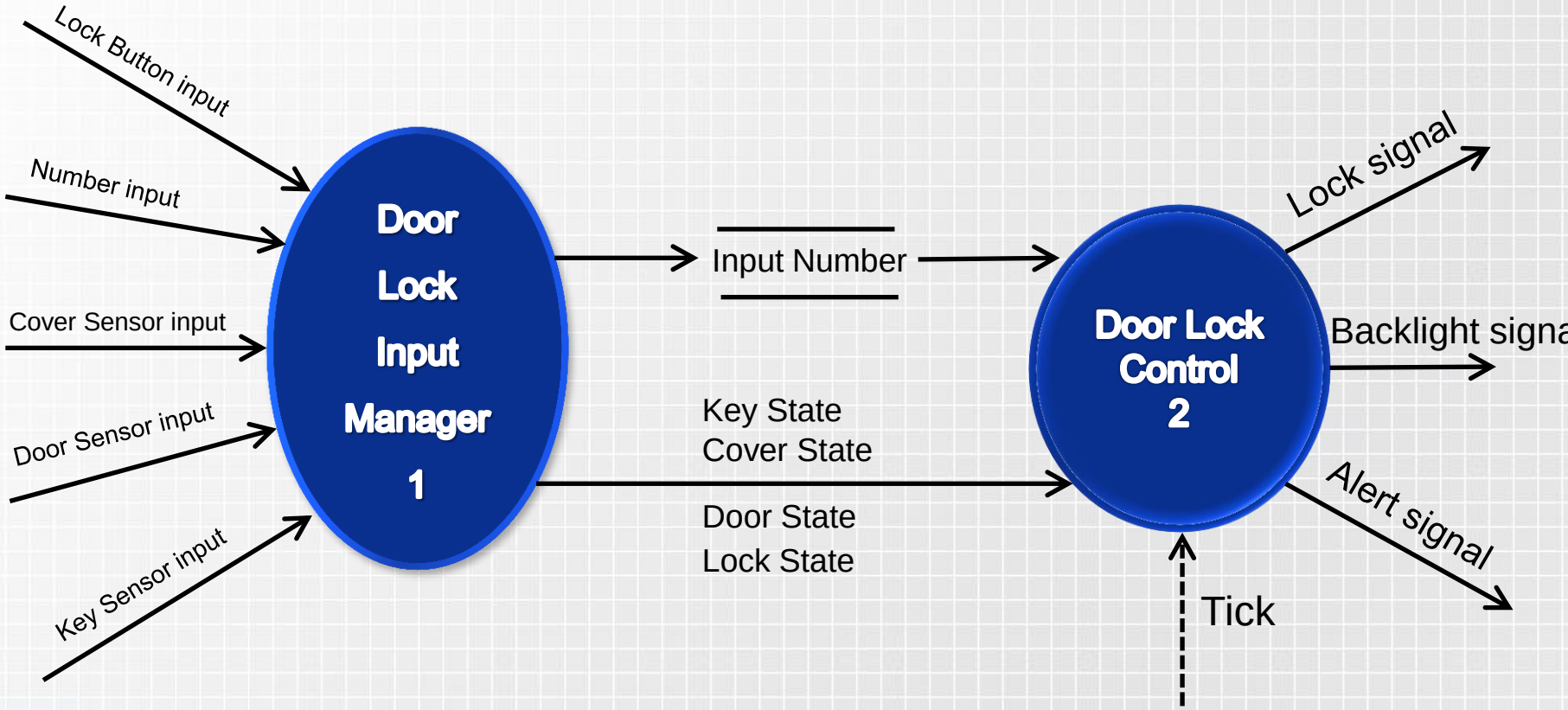
DFD LEVEL 0 – Process Specification

Reference No.	**0**
Name	DLSC
Input	LockButton input, Number input, CoverSensor input, DoorSensor input, KeySensor input, Tick
Output	Lock signal, Backlight signal, Alert signal
Process Description	Button 과 Sensor 를 입력 받아, 각 조건에 맞게 Lock , Backlight , Alert를 실행한다.

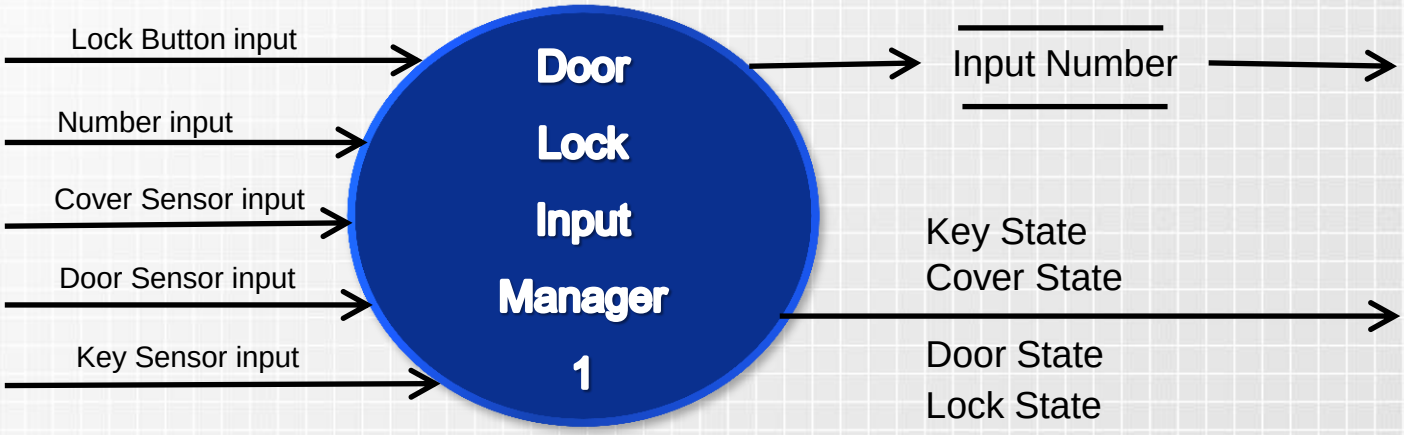
DFD LEVEL 0 - Data Dictionary

Input/Output Event	Description	Format/Type
Lock Button input	문을 수동으로 열고 닫을 수 있다.	True/False , interrupt
Number input	숫자를 입력 받는다.	Integer , interrupt
Cover Sensor input	숫자를 누를 수 있게 덮개를 열고 닫는다.	Open/Close , Periodic
Door Sensor input	문의 상태를 확인한다.	True/False , Periodic
Key Sensor input	열쇠입력을 확인한다.	True/False , Periodic
Lock signal	Open/Close	Open/Close
Backlight signal	On/Off	On/Off
Alert signal	Alert1, Alert2, Alert3	On/Off

DFD LEVEL 1

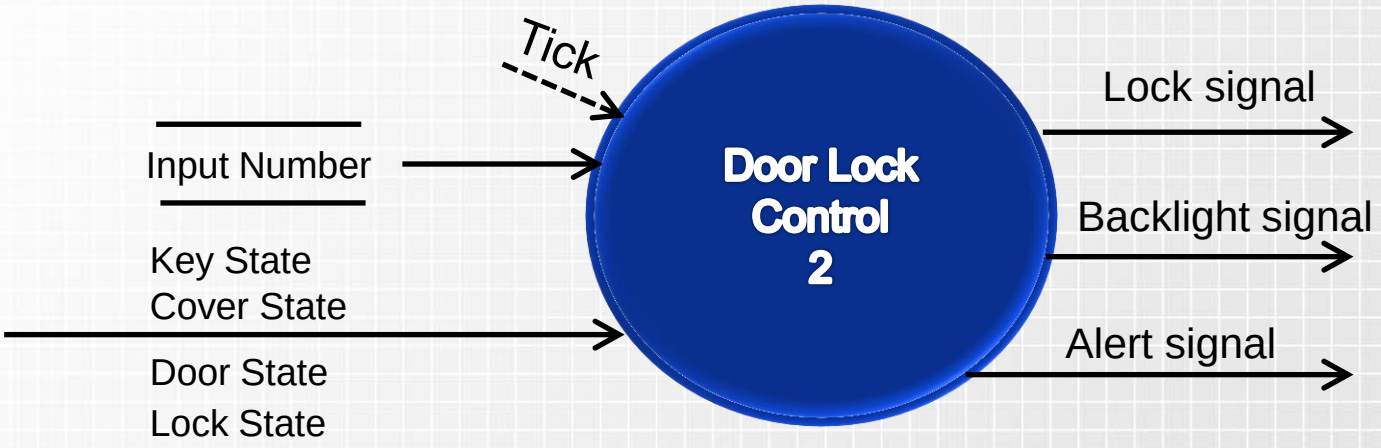

Lock Button input
Number input
Cover Sensor input
Door Sensor input
Key Sensor input
Door Lock Input Manager 1
Input Number
Key State
Cover State
Door State
Lock State
Door Lock Control 2
Lock signal
Backlight signa
Alert signal
Tick

DFD LEVEL 1 – Process Specification



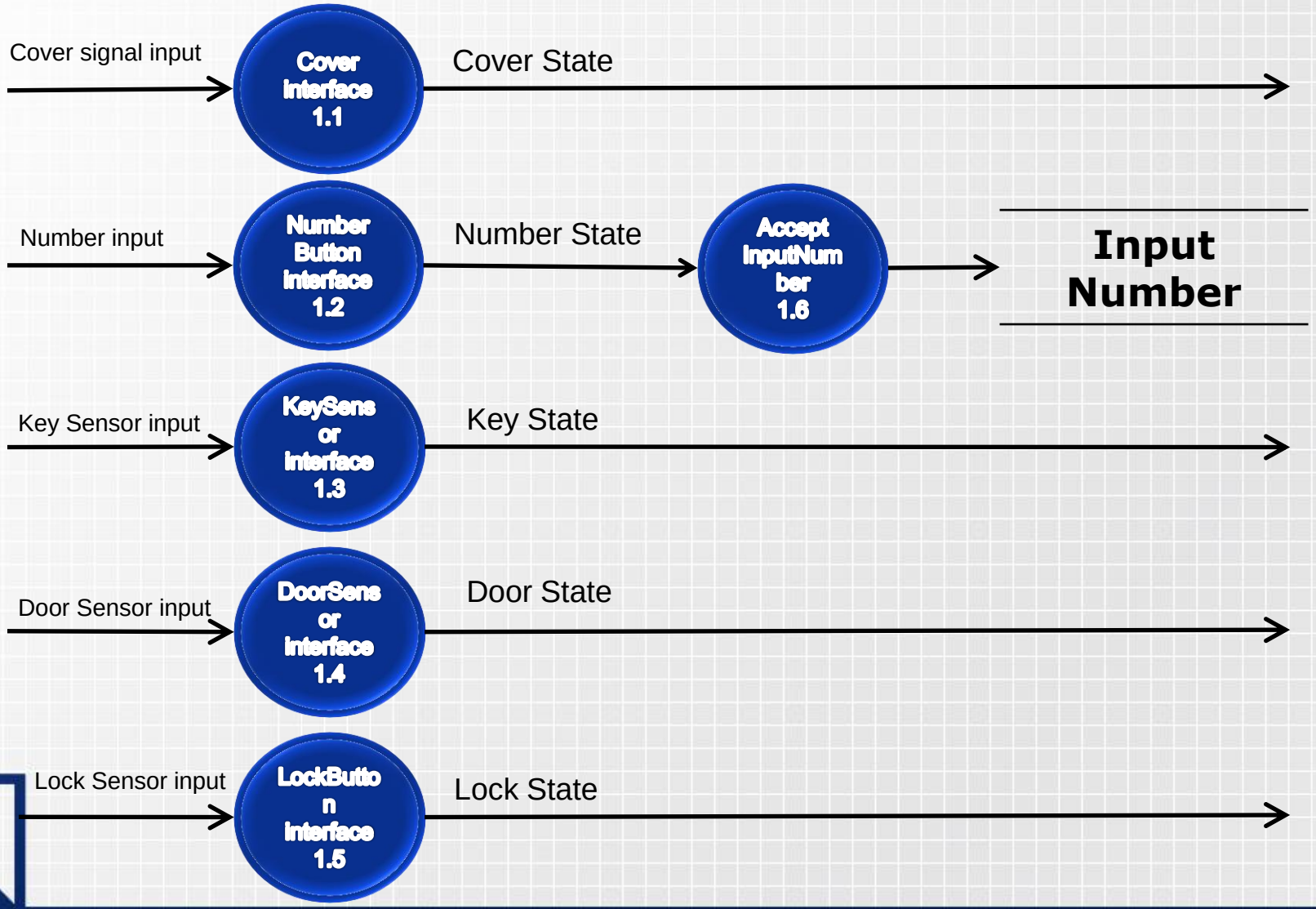
Reference No.	**1**
Name	Door Lock Input Manager
Input	Lock Button input, Number input, Cover Sensor input, Door Sensor input, Key Sensor input
Output	Input Number , Key State , Cover State , Door State , Lock State
Process Description	‘Number Input’을 전달받아 ‘Input Number’ Date Store에 저장하고, 이외 입력 값들은 Door Lock Control에 ‘State’를 전달한다.

DFD LEVEL 1 – Process Specification



Reference No.	**2**
Name	Door Lock Control
Input	Input Number , Key State , Cover State , Door State , Lock State
Output	Lock Signal , Alert Signal , Backlight Signal
Process Description	'Input Number' 와 'State' 정보를 기반으로 각각의 'Signal' 정보를 전달한다.

DFD LEVEL 2


Cover signal input
Cover Interface 1.1
Cover State
Number input
Number Button Interface 1.2
Number State
Accept InputNumber 1.6
Input Number
Key Sensor input
KeySensor Interface 1.3
Key State
Door Sensor input
DoorSensor Interface 1.4
Door State
Lock Sensor input
LockButton Interface 1.5
Lock State

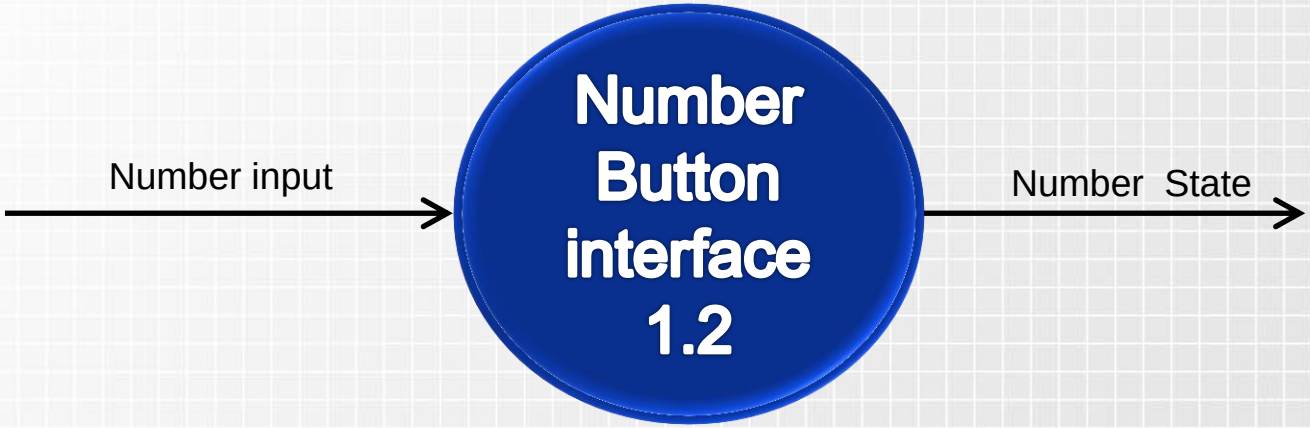
DFD LEVEL 2 - Data Dictionary

Input/Output Event	Description	Format/Type
Cover State	Cover signal의 digital data	Binary
Number State	Number의 digital data	Binary / Periodic
Key State	Key Sensor의 digital data	Binary
Door State	Door Sensor의 digital data	Binary
Lock State	Lock Sensor의 digital data	Binary
Input Number	숫자가 저장된다.	Integer

DFD LEVEL 2 – Process Specification

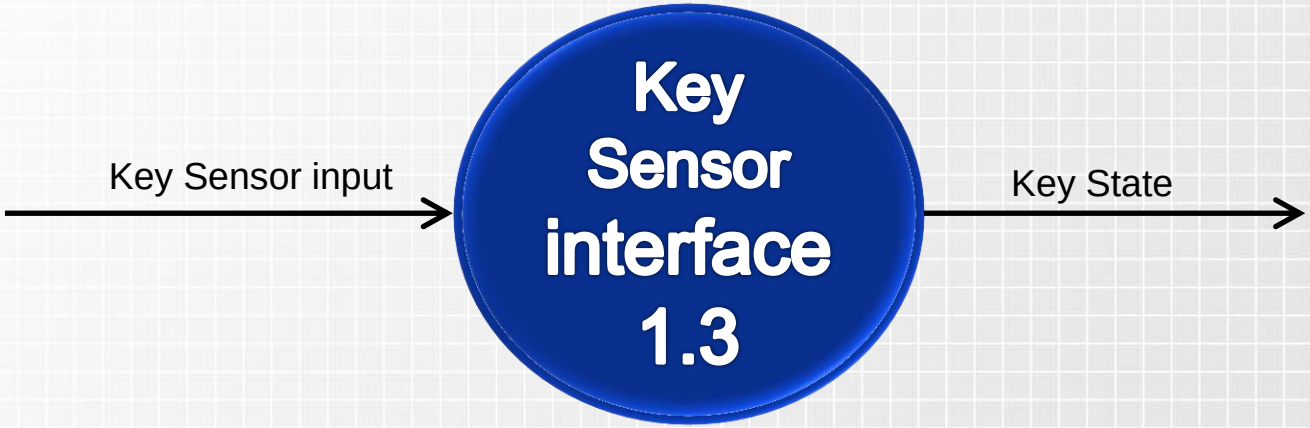
Reference No.	**1.1**
Name	Cover interface
Input	Cover signal input
Output	Cover State
Process Description	‘Cover signal input’을 받아 덮개가 닫혔으면 false, 열렸으면 true로 신호를 내보낸다.

DFD LEVEL 2 – Process Specification



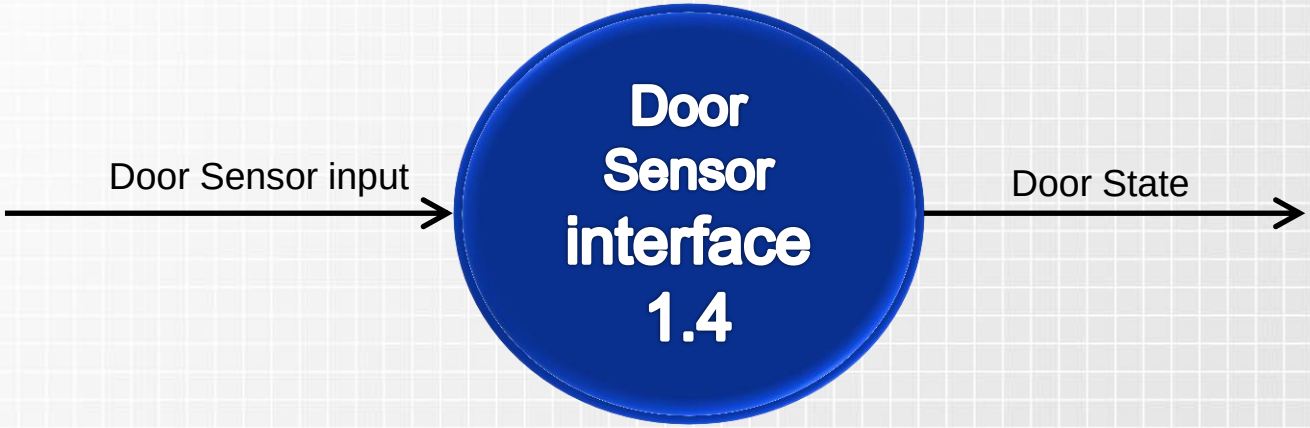
Reference No.	**1.2**
Name	Number Button interface
Input	Number input
Output	Number State
Process Description	아날로그 신호인 'Number input'을 입력 받아, 디지털 신호로 바꾸어 전송한다.

DFD LEVEL 2 – Process Specification



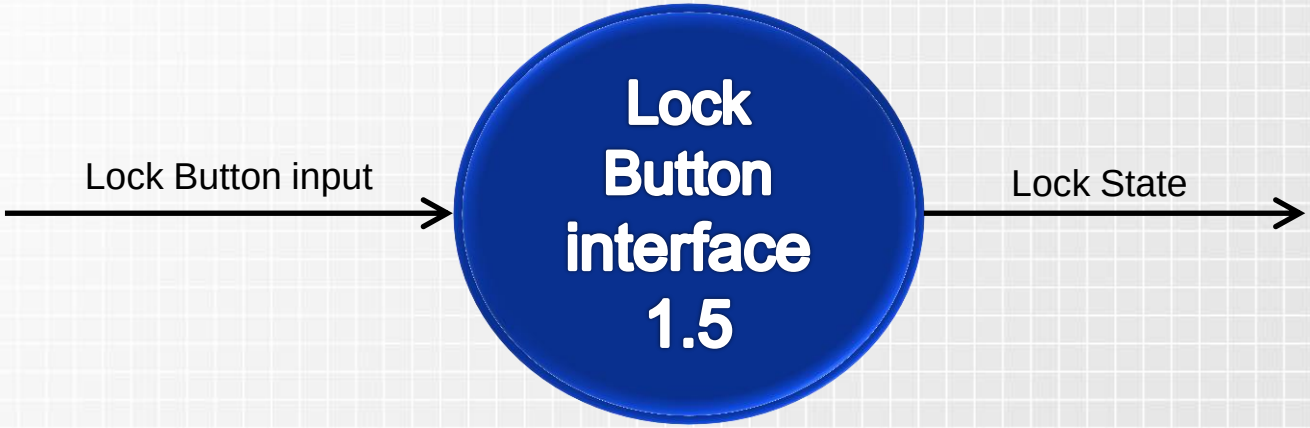
Reference No.	**1.3**
Name	Key Sensor Interface
Input	Key Sensor input
Output	Key State
Process Description	‘Key Sensor input’을 입력 받아 열쇠정보를 내보낸다.

DFD LEVEL 2 – Process Specification



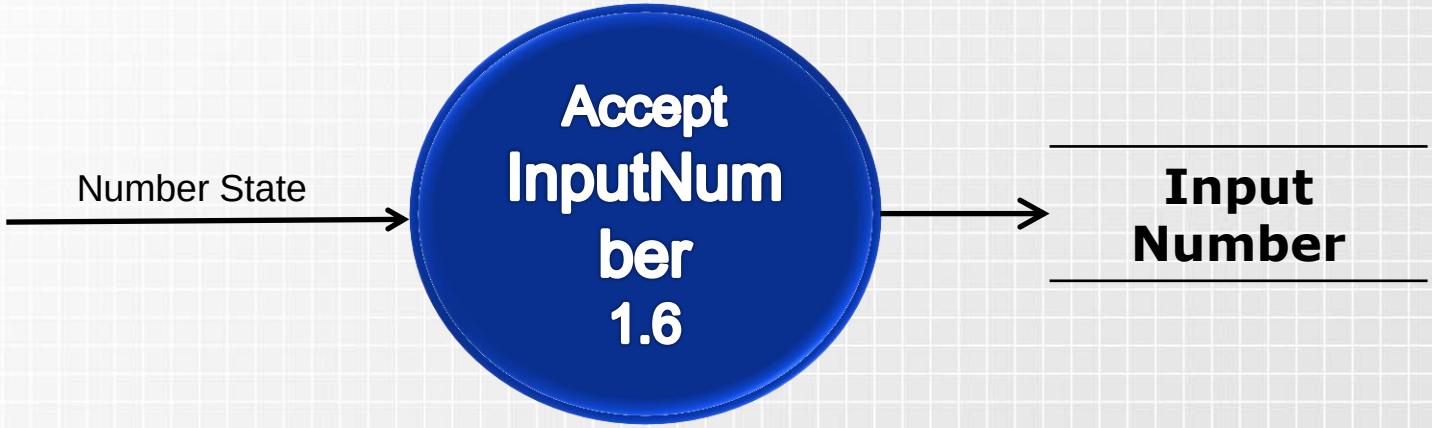
Reference No.	**1.4**
Name	Door Sensor interface
Input	Door Sensor input
Output	Door State
Process Description	‘Door Sensor input’을 입력 받아 문이 닫혀있으면 true, 열려있으면 false 신호를 내보낸다.

DFD LEVEL 2 – Process Specification



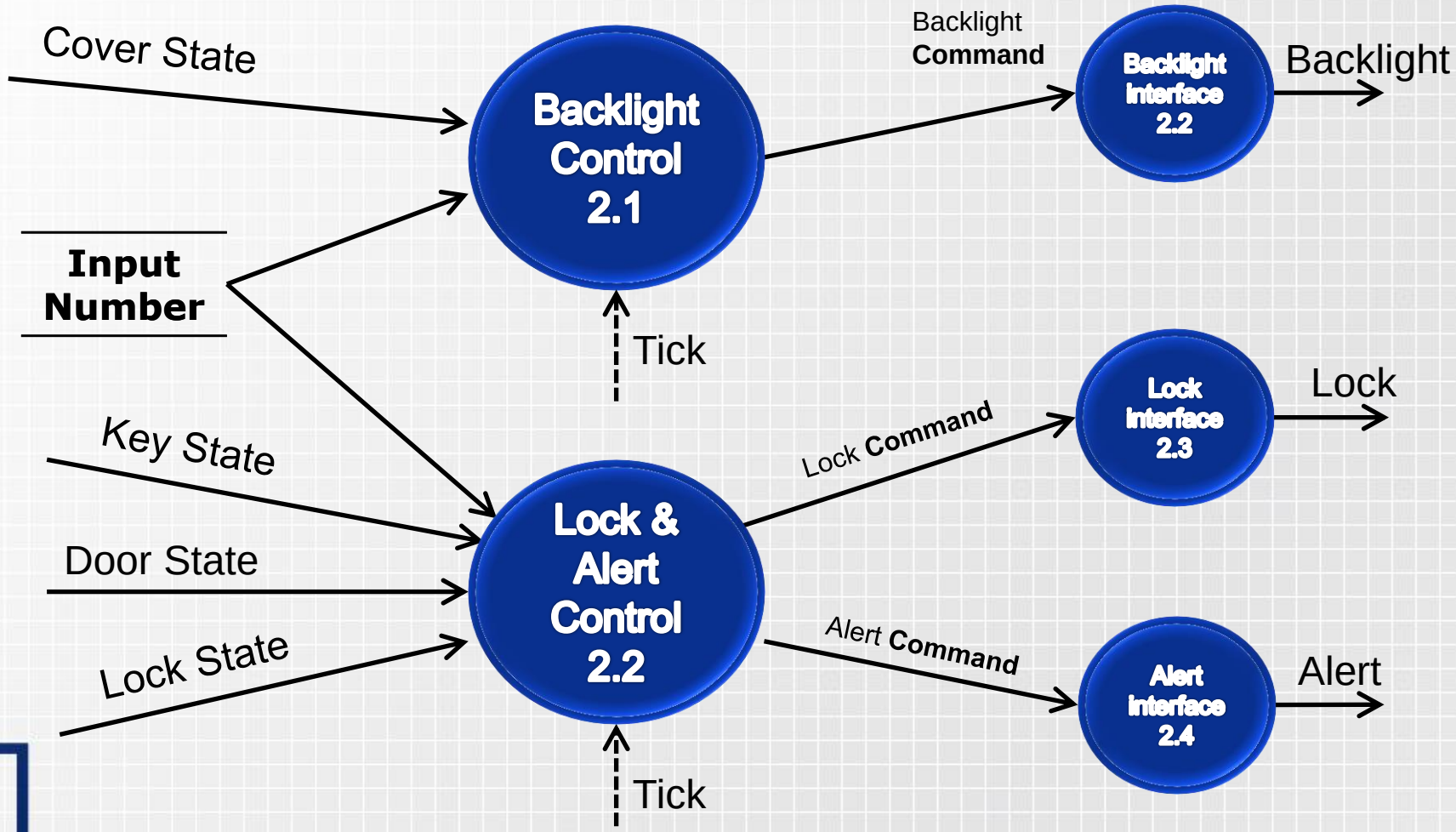
Reference No.	**1.5**
Name	Lock Button interface
Input	Lock Button input
Output	Lock State
Process Description	'LockButton input'을 입력 받아 잠금버튼이 눌리면 true, 그렇지 않으면 false 신호를 내보낸다.

DFD LEVEL 2 – Process Specification



Reference No.	**1.6**
Name	Accept Input Number
Input	Number State
Output	Input Number(Integer)
Process Description	'Number State'를 통해 입력 받은 Data를 0~9를 구분하여 'Input Number'에 저장한다.

DFD LEVEL 2


Cover State
Backlight Control 2.1
Backlight Command
Backlight Interface 2.2
Backlight
Input Number
Tick
Key State
Lock Command
Lock Interface 2.3
Lock
Door State
Lock & Alert Control 2.2
Alert Command
Alert Interface 2.4
Alert
Lock State
Tick

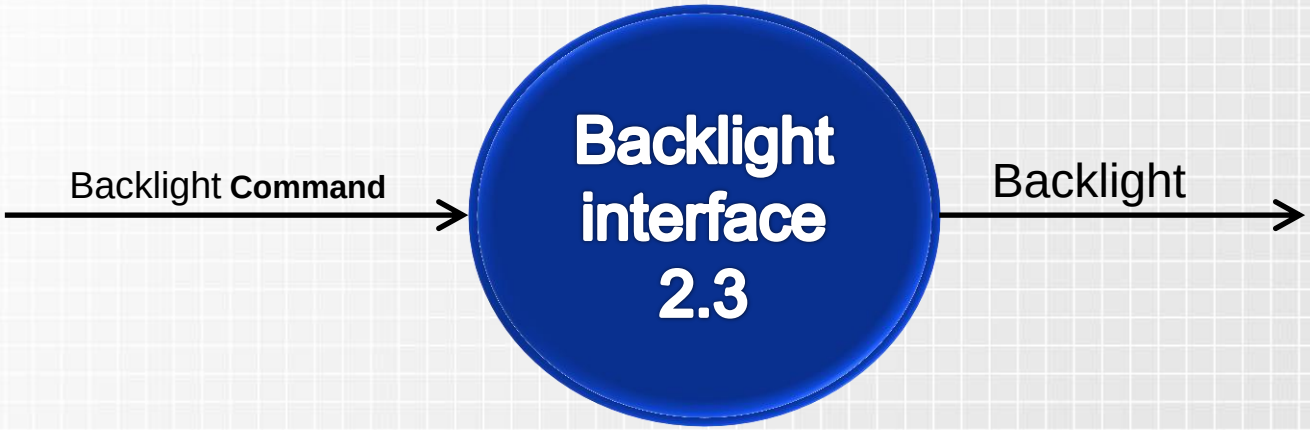
DFD LEVEL 2 – Process Specification

Reference No.	**2.1**
Name	Backlight Control
Input	Cover State, Input Number
Output	Backlight Command
Process Description	'Cover State'와 'Input Number'를 입력 받아 명령어인 'Backlight Command'를 'Backlight interface'에 보낸다.

DFD LEVEL 2 – Process Specification

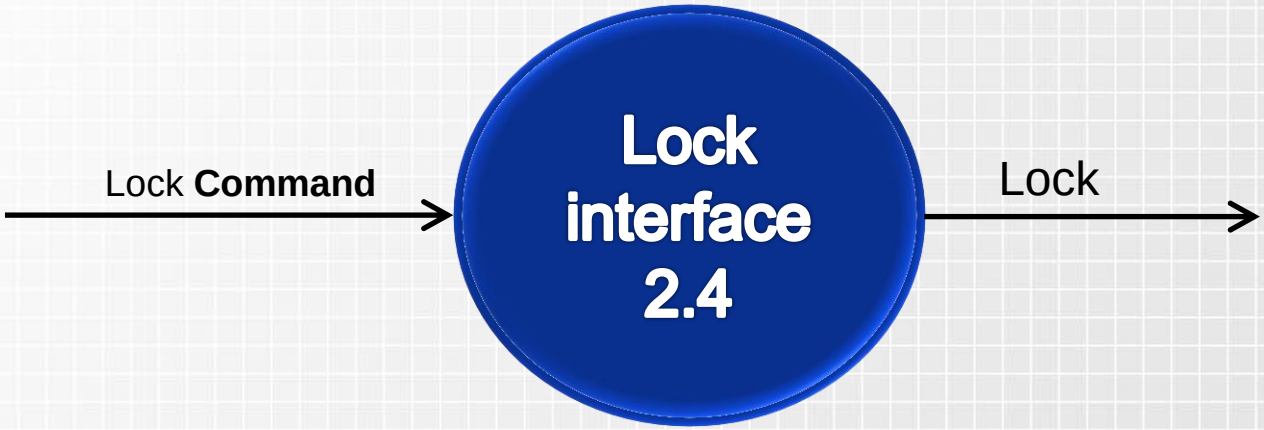
Reference No.	**2.2**
Name	Lock & Alert Control
Input	Input Number, Key State, Door State, Lock State, Tick
Output	Lock Command, Alert Command
Process Description	'Input Number', 'Key State', 'Door State', 'Lock State'을 입력 받아 명령어인'Lock Command'은 'Lock Interface', 'Alert Command'은 'Alert Interface'로 보낸다.

DFD LEVEL 2 – Process Specification



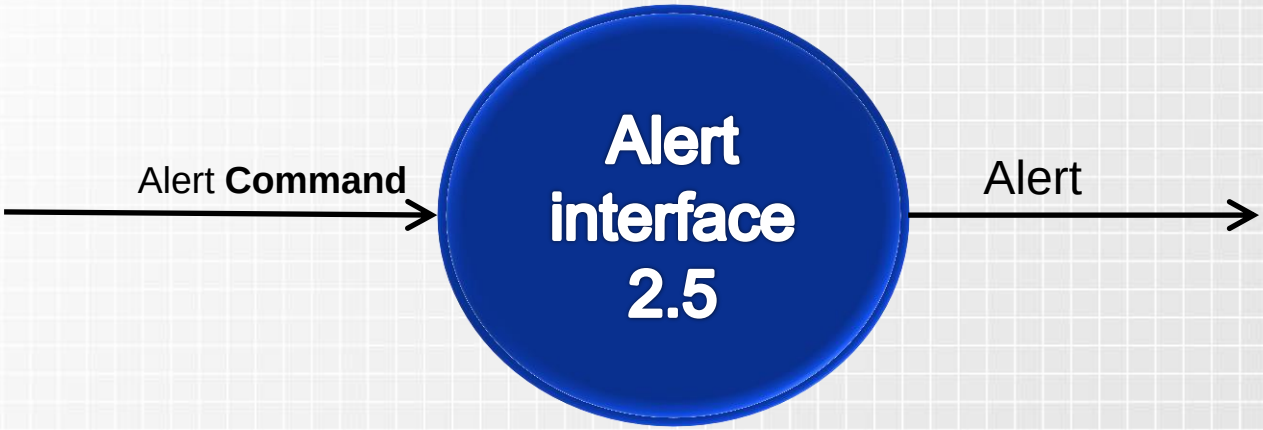
Reference No.	**2.3**
Name	Backlight interface
Input	Backlight command
Output	Backlight
Process Description	‘Backlight Command’를 입력 받아 그에 맞는 신호를 전달한다.

DFD LEVEL 2 – Process Specification



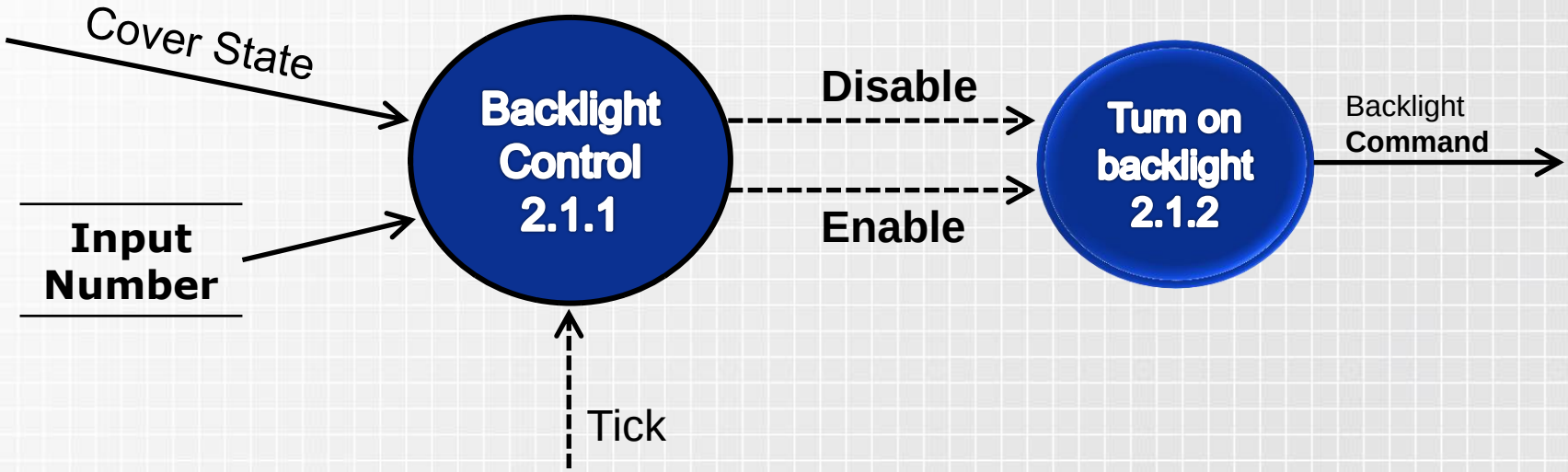
Reference No.	**2.4**
Name	Lock interface
Input	Lock Command
Output	Lock
Process Description	‘Lock Command’를 입력 받아 그에 맞는 신호를 전달한다.

DFD LEVEL 2 – Process Specification

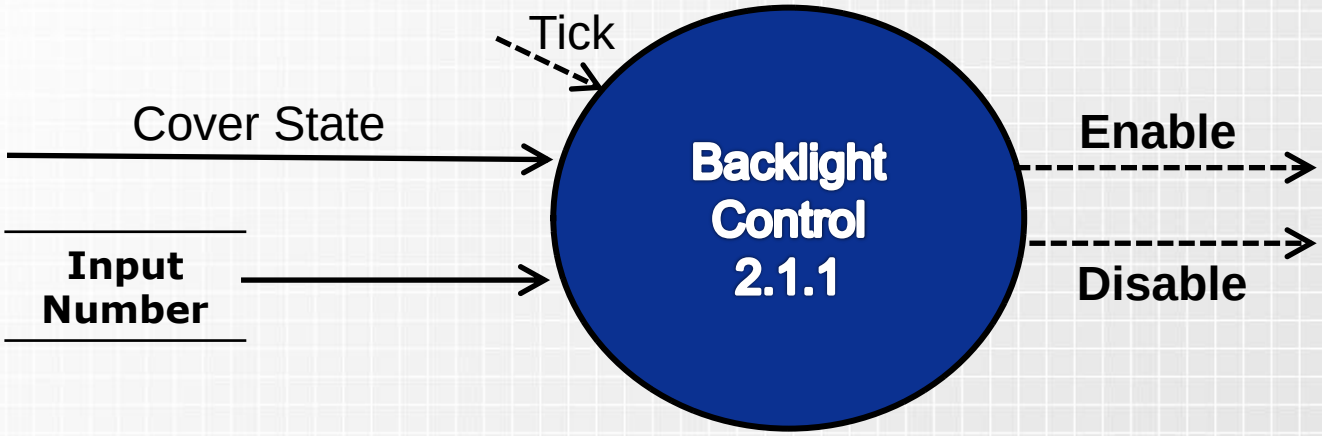


Reference No.	**2.5**
Name	Alert interface
Input	Alert command
Output	Alert
Process Description	'Alert Command'를 입력 받아 그에 맞는 신호를 전달한다.

DFD LEVEL 3

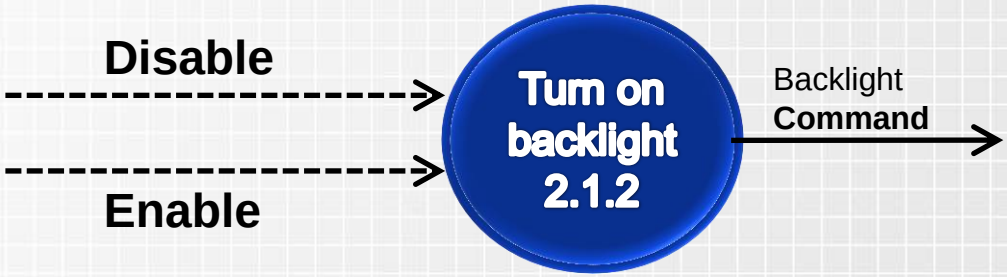

Cover State
Input Number
Backlight Control 2.1.1
Tick
Disable
Enable
Turn on backlight 2.1.2
Backlight Command

DFD LEVEL 3 – Process Specification



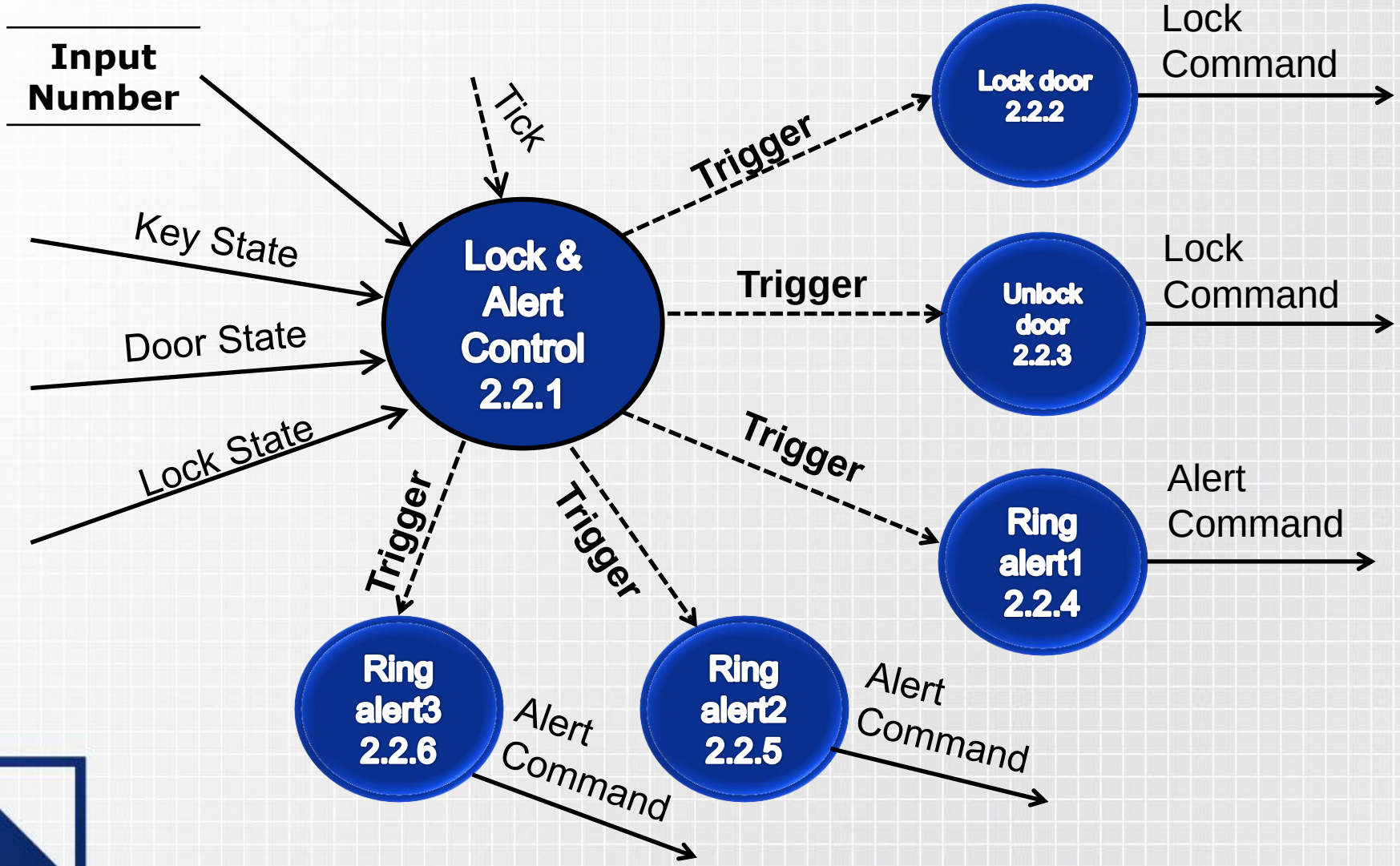
Reference No.	**2.1.1**
Name	Backlight Control
Input	CoverState, InputNumber, Tick
Output	Enable / Disable
Process Description	입력받은 숫자와 덮개 정보를 분석하여 백라이트 on/off 트리거를 각각의 인터페이스로 전달하여 준다

DFD LEVEL 3 – Process Specification

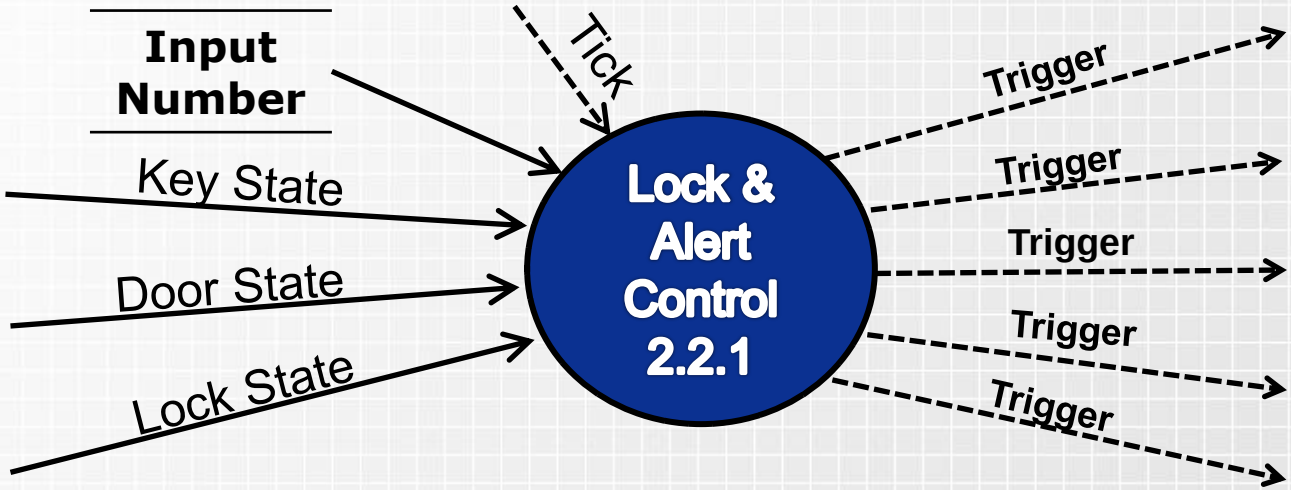


Reference No.	**2.1.2**
Name	Turn on backlight
Input	Enable / Disable
Output	Backlight Command
Process Description	'Enable'이면 Backlight가 켜지고 'Disable'이면 Backlight가 꺼지는 'Backlight Command'를 보낸다.

DFD LEVEL 3


Input Number
Tick
Key State
Door State
Lock State
Lock & Alert Control 2.2.1
Trigger
Lock door 2.2.2
Lock Command
Trigger
Unlock door 2.2.3
Lock Command
Trigger
Ring alert1 2.2.4
Alert Command
Trigger
Trigger
Ring alert3 2.2.6
Alert Command
Ring alert2 2.2.5
Alert Command

DFD LEVEL 3 – Process Specification



Reference No.	**2.2.1**
Name	Lock&Alert Control
Input	InputNumber, Key, DoorState, LockSignal, Tick
Output	Trigger
Process Description	들어오는 정보와 내부에 저장된 정보들을 이용하여 상황에 맞게 잠금 장치와 경보장치에 이벤트를 발생하는 'Trigger'를 보낸다. 저장된 정보 : (최초입력)비밀번호, 키 정보

DFD LEVEL 3 – Process Specification

Reference No.	**2.2.2**
Name	Lock door
Input	Trigger
Output	Lock Command
Process Description	트리거가 들어오면 'Lock'을 향해 잠금장치를 잠그는 'Lock Command'를 보낸다.

DFD LEVEL 3 – Process Specification

Reference No.	**2.2.3**
Name	Unlock door
Input	Trigger
Output	Lock Command
Process Description	트리거가 들어오면 'Lock'을 향해 잠금장치를 여는 'Lock Command'를 보낸다.

DFD LEVEL 3 – Process Specification

Reference No.	**2.2.4**
Name	Ring alert1
Input	Trigger
Output	Alert Command
Process Description	트리거가 들어오면 'Alert'을 향해 경보1을 울리는 'Alert Command'를 보낸다.

DFD LEVEL 3 – Process Specification

Reference No.	**2.2.5**
Name	Ring alert2
Input	Trigger
Output	Alert Command
Process Description	트리거가 들어오면 'Alert'을 향해 경보2을 울리는 'Alert Command'를 보낸다.

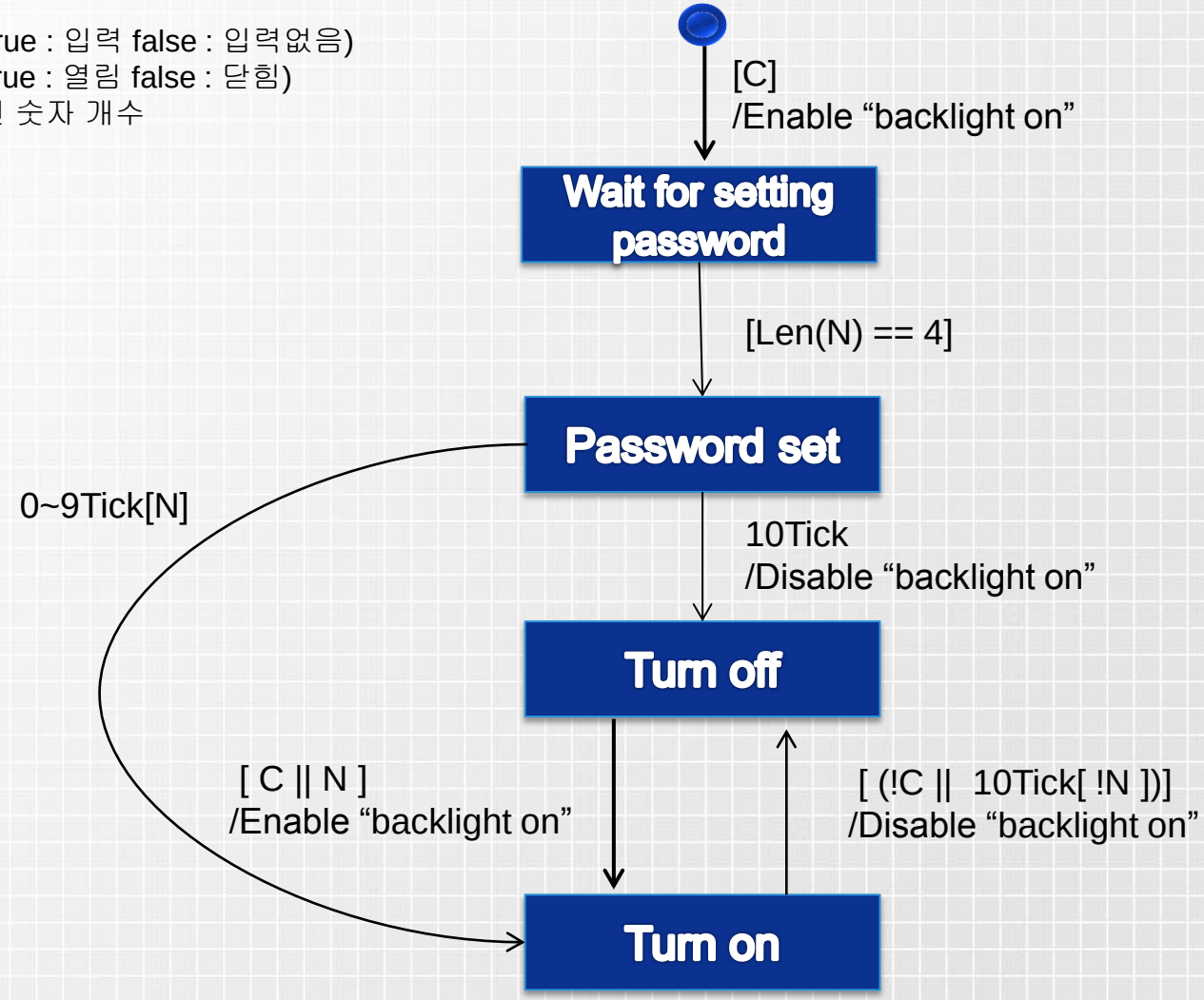
DFD LEVEL 3 – Process Specification

Reference No.	**2.2.6**
Name	Ring alert3
Input	Trigger
Output	Alert Command
Process Description	트리거가 들어오면 'Alert'을 향해 경보3을 울리는 'Alert Command'를 보낸다.

DFD LEVEL 3

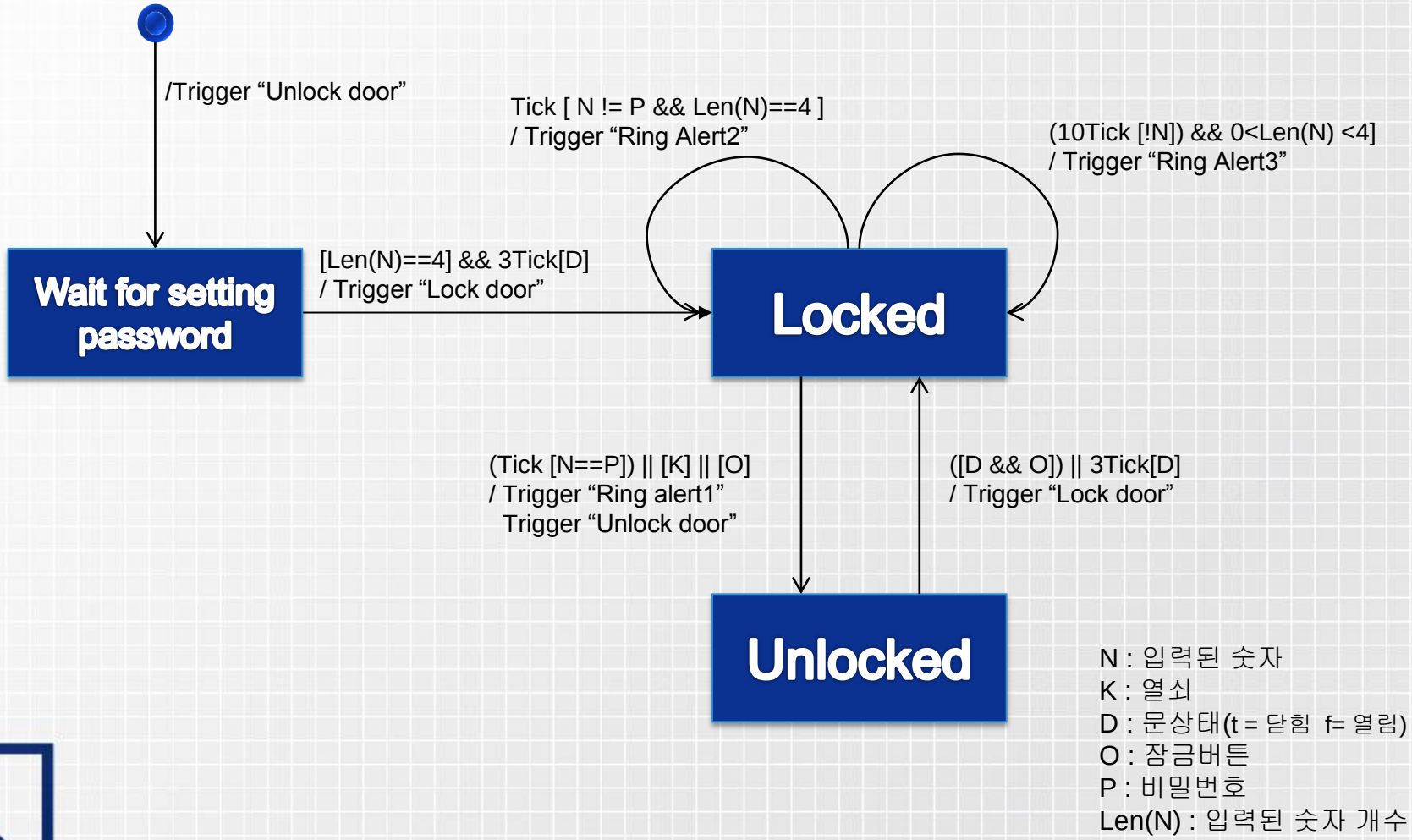
State Transition Diagram for backlight controller 2.1.1

N : 숫자입력 (true : 입력 false : 입력없음)
C : 덮　　개 (true : 열림 false : 닫힘)
Len(N) : 입력된 숫자 개수



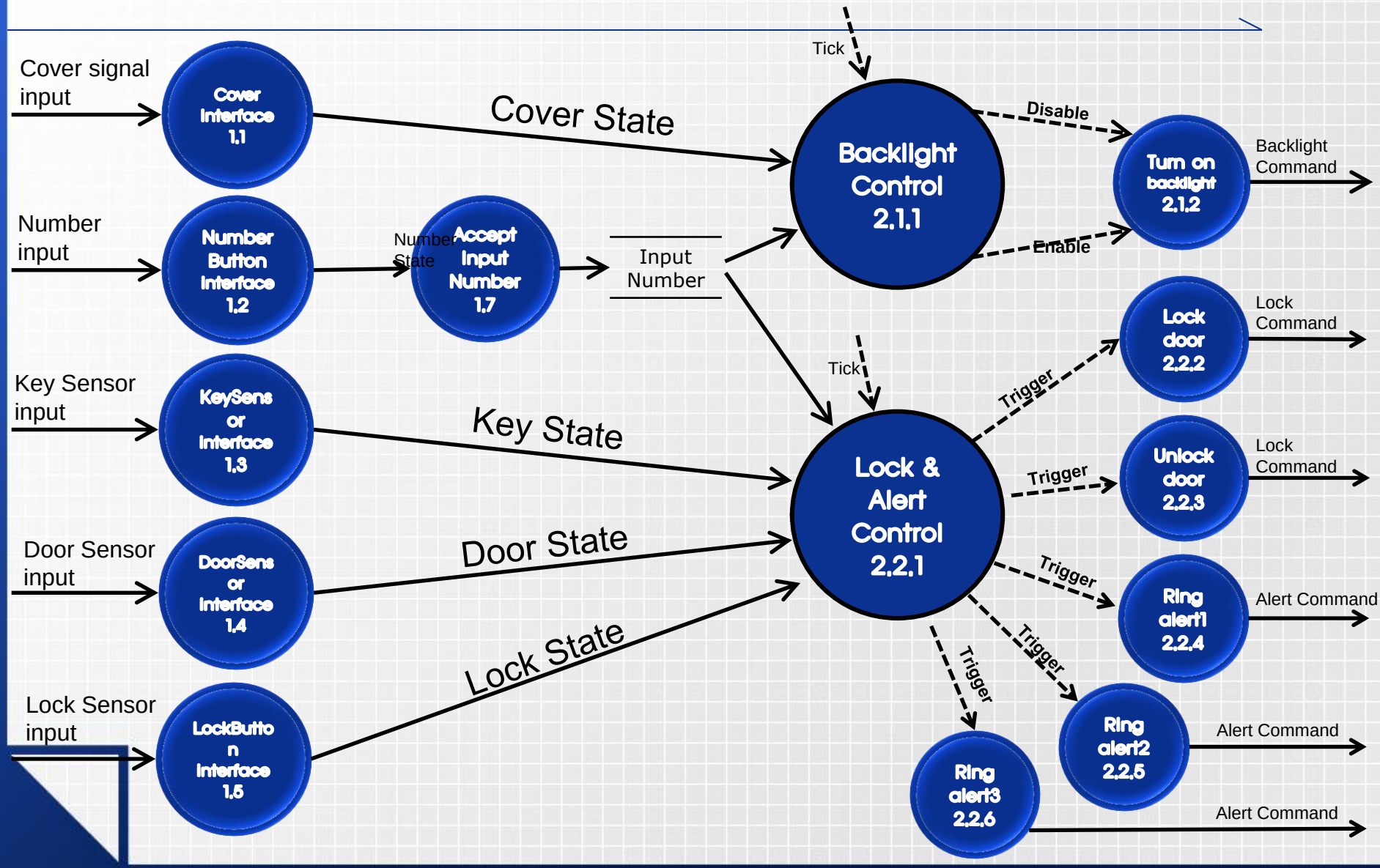
DFD LEVEL 3

State Transition Diagram for backlight controller 2.2.1



N : 입력된 숫자
K : 열쇠
D : 문상태(t = 닫힘 f= 열림)
O : 잠금버튼
P : 비밀번호
Len(N) : 입력된 숫자 개수

Overral


Cover signal input
Cover Interface 1.1
Cover State
Number input
Number Button Interface 1.2
Number State
Accept Input Number 1.7
Input Number
Key Sensor input
KeySensor Interface 1.3
Key State
Door Sensor input
DoorSensor Interface 1.4
Door State
Lock Sensor input
LockButton Interface 1.5
Lock State
Tick
Backlight Control 2.1.1
Disable
Enable
Turn on backlight 2.1.2
Backlight Command
Tick
Lock & Alert Control 2.2.1
Trigger
Lock door 2.2.2
Lock Command
Trigger
Unlock door 2.2.3
Lock Command
Trigger
Ring alert1 2.2.4
Alert Command
Trigger
Trigger
Ring alert2 2.2.5
Alert Command
Trigger
Ring alert3 2.2.6
Alert Command

느낀점

프로그래밍하기 전에 간단한 설계는 해봤지만 SA와 SD를 작성해보는 건 처음이라 많은 시간이 걸렸다.

특히 초반에는 DFD와 Flow chart가 혼동돼서 DFD를 이해하고 작성하는 데 애를 먹었다.

작성을 하면서 이런 사소한 것들에까지 모두 명세가 요구될 필요가 있나 싶은 생각도 들었지만 모두에게 새로운 작업이라 흥미로웠고, 실제 이걸 토대로 프로그래밍을 한다면 제대로 만들어지고 동작할 지 궁금하기도 했다.

Q&A

Thank You !