

Technical Introduction of SCIM Package

1 SCIM PACKAGE Configuration

◇ SCIM UNIT

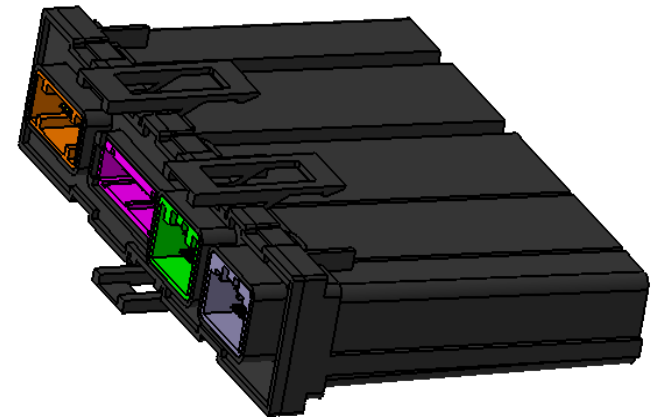
◇ General Specifications

- ✓ Operating Voltage Range : 16V ~ 32V (nom 24V)
- ✓ Operating Temperature : -40℃ ~ 85℃
- ✓ Storage Temperature : -40℃ ~ 100℃
- ✓ LF Frequency : 125KHz
- ✓ RF Frequency : 433.92MHz(315MHz Only Japan)
- ✓ Dark Current

| Mode | RFQ | Proposal |
|-----------------------------|---------|----------|
| Operational, ref state ISS0 | < 40mA | < 30mA |
| Standby State(LIN Sleep) | < 4mA | < 2.5mA |
| Standby State(Security) | < 3mA | < 2mA |
| Sleep State | < 0.3mA | < 0.3mA |

◇ Package

1. Size : 175 x 145 x 45 mm
 2. Weight : Less than 300g
- ※ Design and specification can be changed



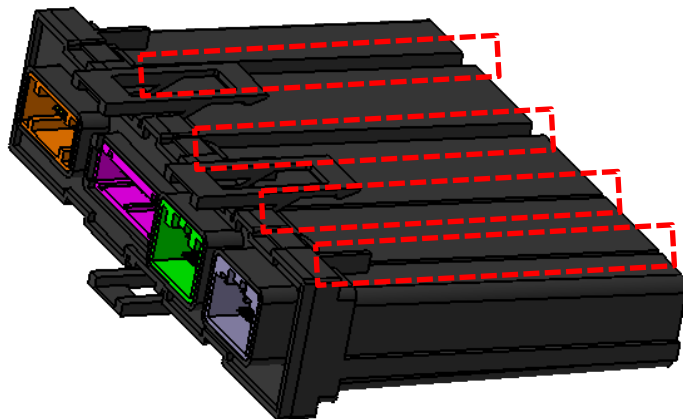
<REFERENCE UNIT VIEW>

1 SCIM PACKAGE Configuration

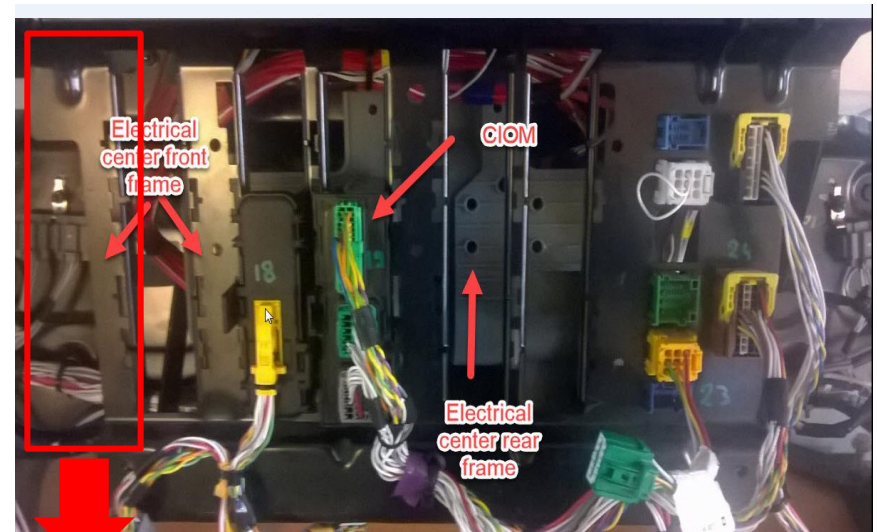
◇ SCIM UNIT

◇ Mounting Layout

- ✓ Sliding assembly structure will be applied with its external case hook (Separate Bracket will not be applied)
- ✓ **Mounting Proposal : 1st slot in the EC(Electrical Center)**
- ✓ **In order to meet RKE(RF) Operation Distance with 40M, Seoyon proposes the minimization of interruption made by metal material at RF radiated field**
- ✓ **Necessary to have 53mm separation from SCIM conductor material (Ideal Distance is more than 86mm)**



<REFERENCE UNIT VIEW>



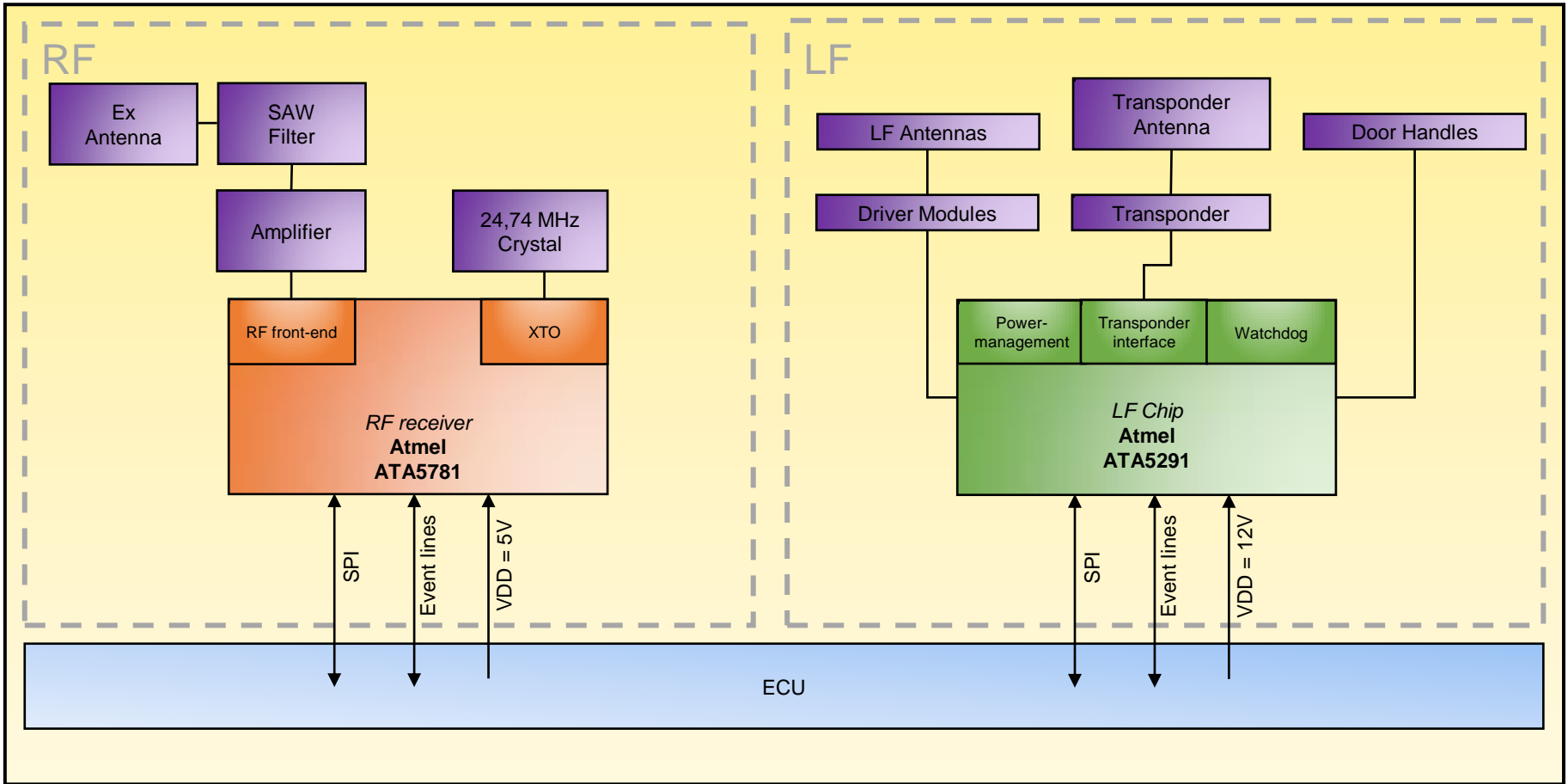
Mounting Point

< MOUNTING Proposal >

1 SCIM PACKAGE Configuration

◇ SCIM UNIT

◇ LF / RF BLOCK DIAGRAM

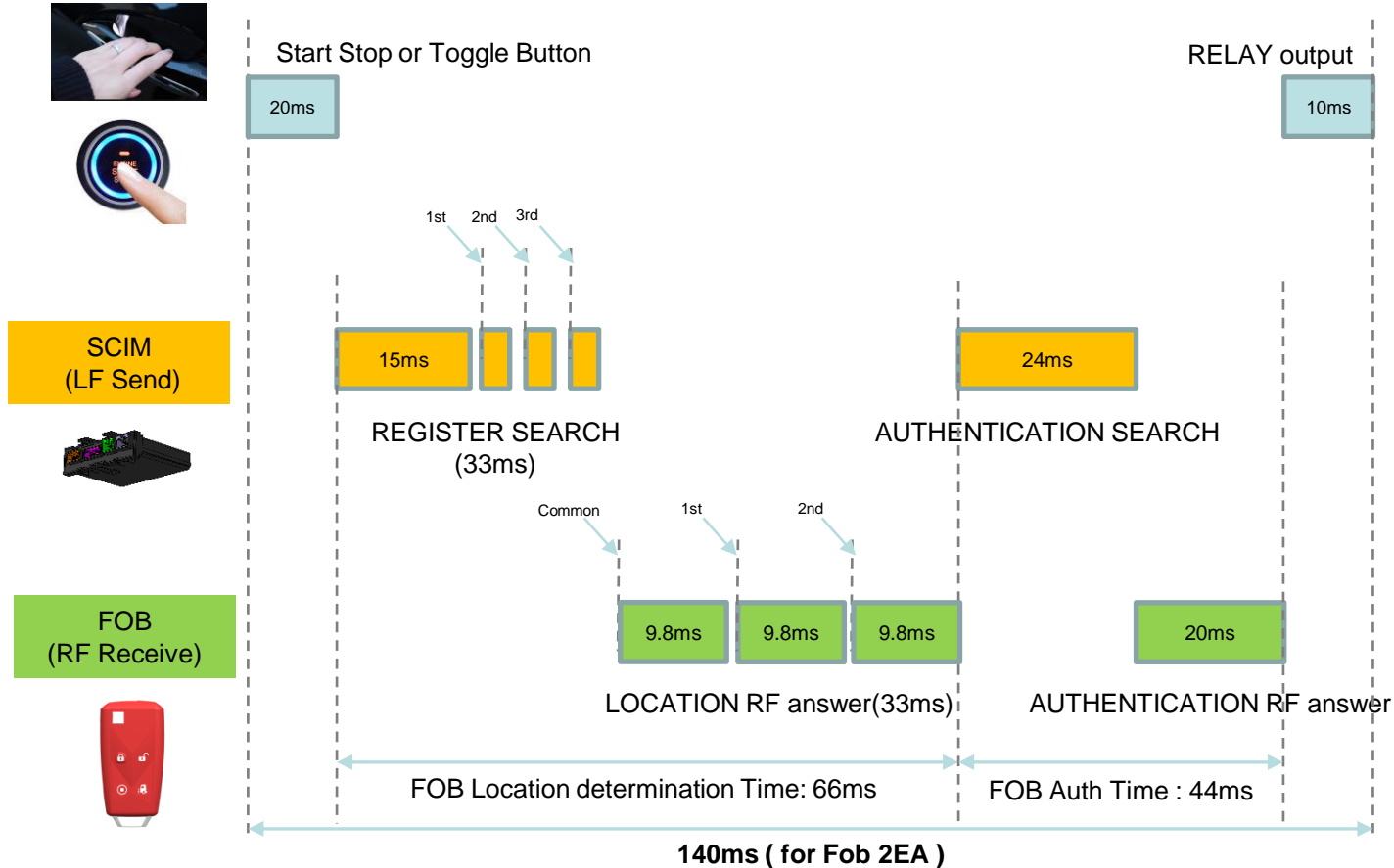


2 System Configuration

◇ Reaction Time Review

◇ FOB Searching Sequence – LF&RF sending and receiving Sequence

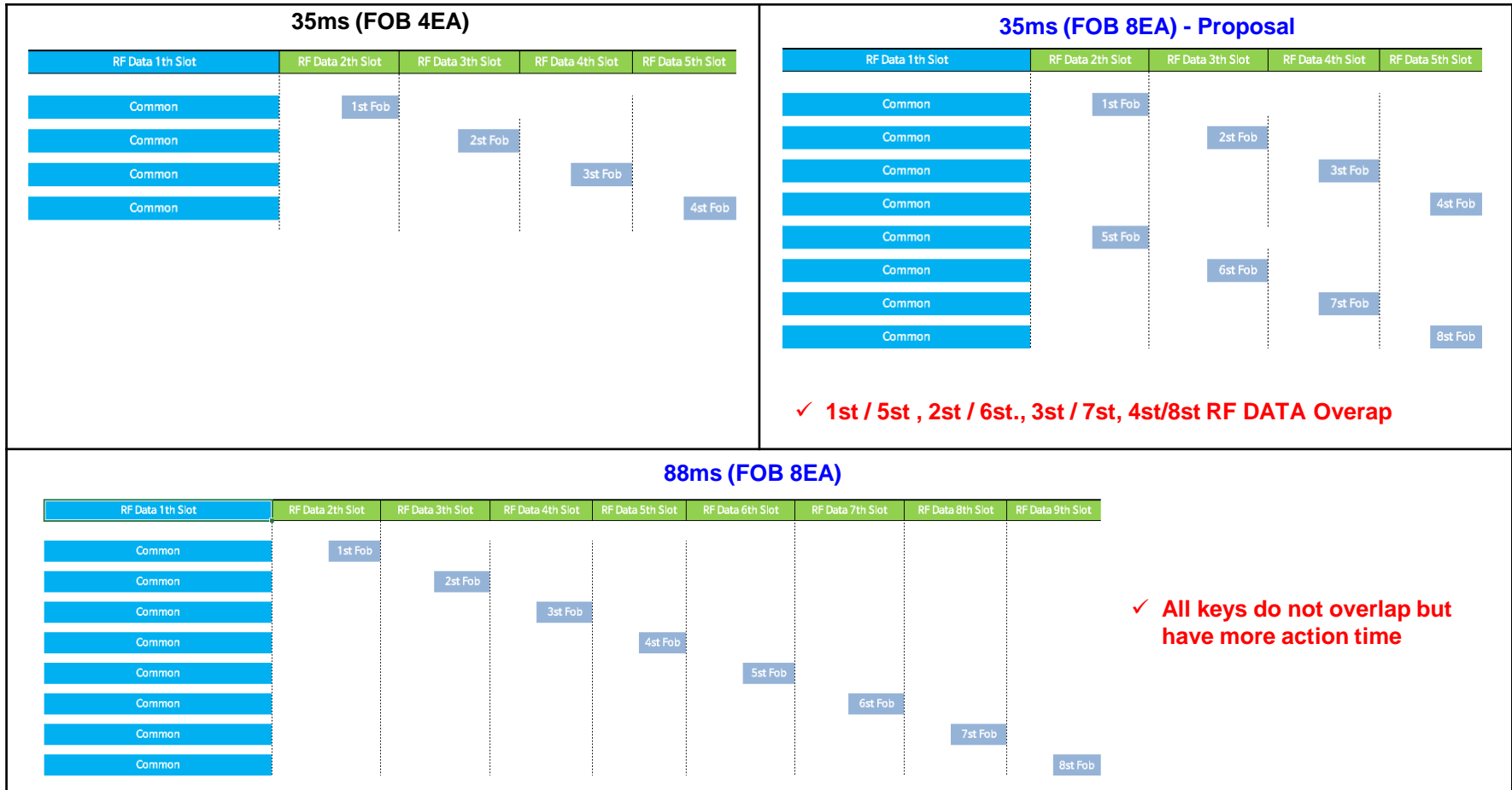
- ▶ LF Frequency : 125KHz
- ▶ RF Frequency : 433.92MHz
- ▶ LF Baud Rate : 3.91kbit/s
- ▶ RF Baud Rate : 9.6kbit/s
- ▶ RKE Baud Rate : 5kbit/s
- ▶ Encryption algorithm : AES128



2 System Configuration

◇ Reaction Time Review

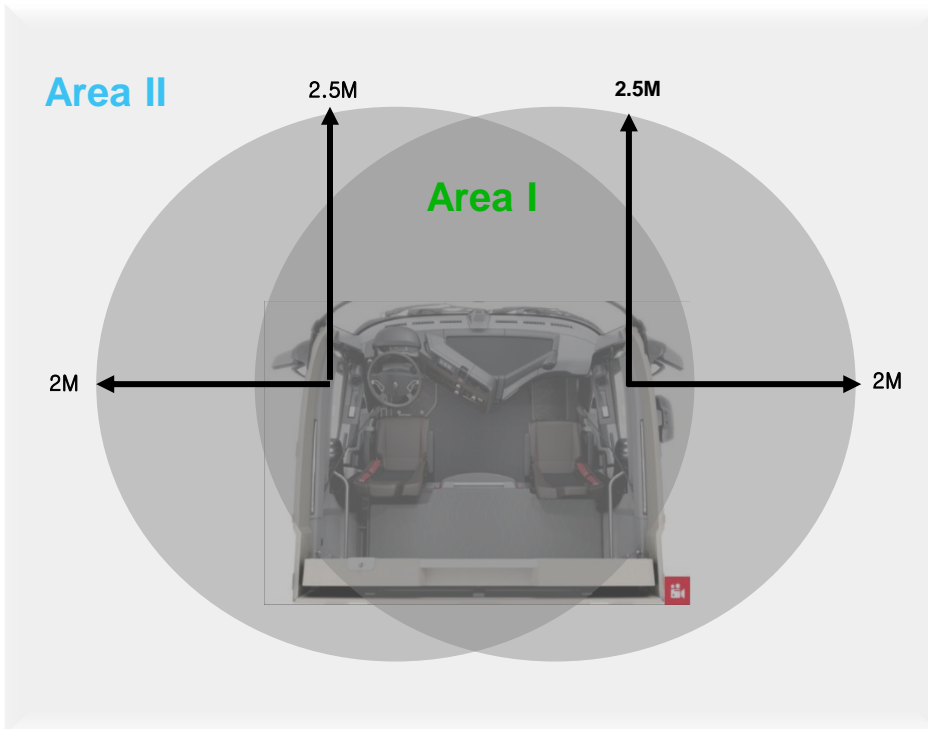
◇ Issue on quantity of FOB



< Location RF Answer Time Slot >

3 System Configuration

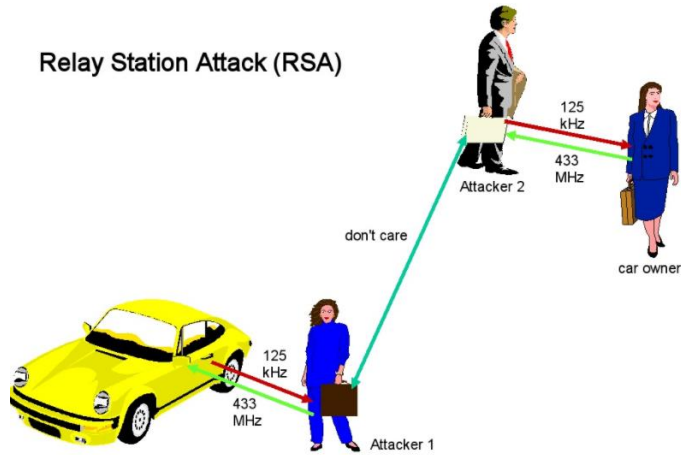
Search Areas



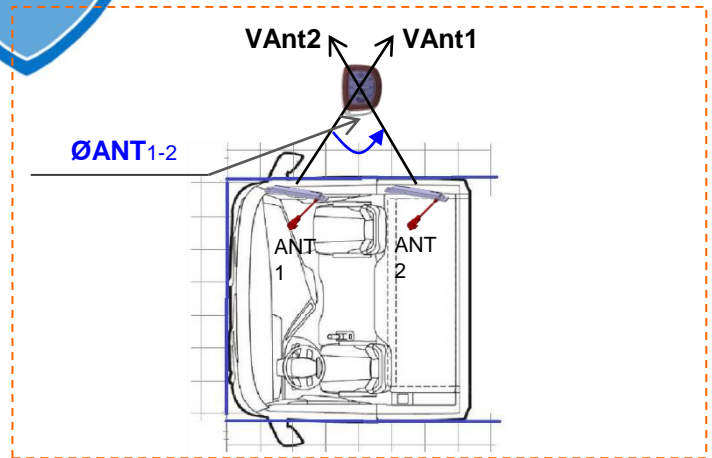
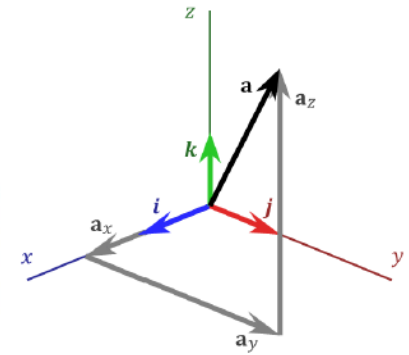
- ✓ **Technical Requirements**
 - ✓ LF Antenna Coverage : Over 3 meters
- ✓ **WAL**
 - ✓ FOB detected in Area I = Lock Standby
 - ✓ FOB detected in Area II = Locking
 - ✓ When the FOB is detected in Area I for more than 3 minutes in Lock Standby state, autodoor locking
- ✓ **SAU**
 - ✓ FOB detected in Area II = Unlock Standby
 - ✓ FOB detected in Area I = Unlocking
- ✓ WAL Lock Fail Warning Func.

4 System Configuration

Security Issues (Relay Station Attack)

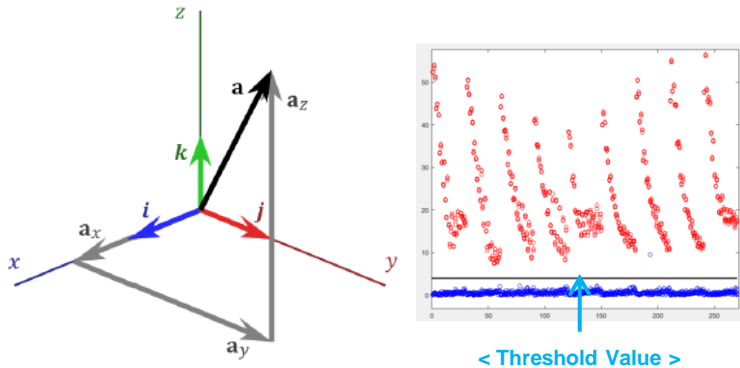


Relay Attack Protection
: Using Angle of Multiple LF Antenna



5 System Configuration

Security Issues (Relay Station Attack)



- **Magnitude of Vector** $\vec{a} = (a_x, a_y, a_z)$

$$\text{magnitude of vector } a = \|a\| = \sqrt{a_x^2 + a_y^2 + a_z^2}$$

Standard Deviation of RSSI value(X, Y, Z)

- No RSA Case : Standard Deviation > Threshold value
- RSA Case : Standard Deviation < Threshold value

- **Angle between two vectors**

$$\varphi_{Ant1-2} = \cos^{-1} \left(\frac{V_{Ant1_x} \times V_{Ant2_x} + V_{Ant1_y} \times V_{Ant2_y} + V_{Ant1_z} \times V_{Ant2_z}}{\|V_{Ant1}\| \times \|V_{Ant2}\|} \right)$$

Angle Calculation

- No RSA Case : $\varnothing_{ANT1-2} >$ Threshold Value
- RSA Case : $\varnothing_{ANT1-2} <$ Threshold Value

- **Test Results : RSA 100% Protection**

