

Direction of requirements and procedures for buses carrying children

IWG-CLIV 7th meeting

2025.2.27

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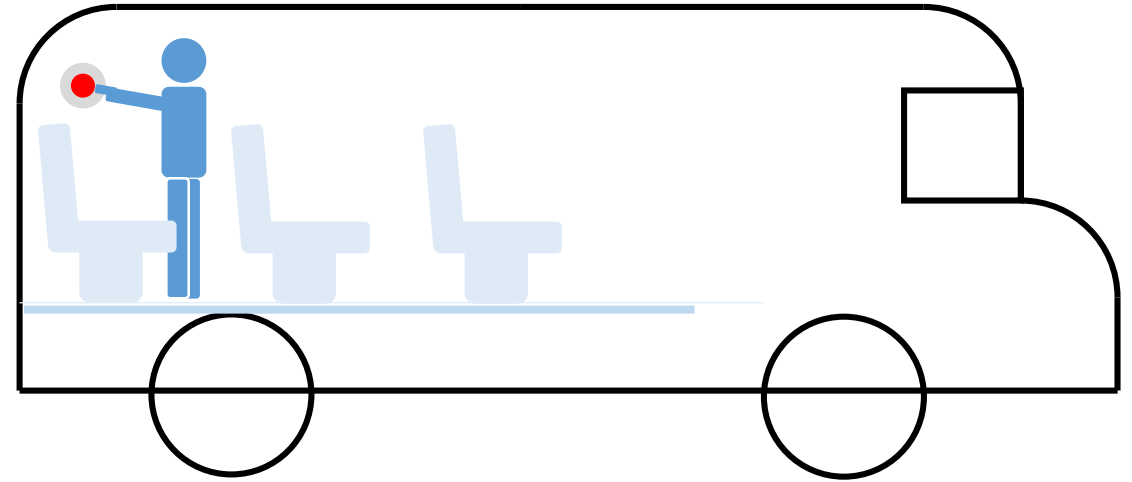
Background

- **IWG-CLIV requested the mandate extension to develop technical and regulatory requirements by UN GTR with UN Regulation in parallel and agreed on dealing with buses and vans first**
- **During IWG-CLIV 5th meeting, IWG presented and discussed countermeasures for buses and light vehicles, and Republic of Korea commented that potentially mandatory countermeasures should be decided for the international regulation establishment after reviewing all countermeasures with stakeholders**

A. System for physical inspection

[Review point] Effectiveness: ●

- **A-1 Unloading child confirmation alert device**
 - a device located at the compartment rear of a bus
 - requires the driver to push a button of the device within a certain time after the end of the journey (turning off the vehicle)
 - the driver may tag or scan the device or use other ways to activate the device after checking no children left on buses



[Child Safety Alert System example]
*source: taken by KATRI at 2022 STN EXPO Reno



[Child Safety Alert System sample]
*source: Korea R&D report [RS-2022-00143581]

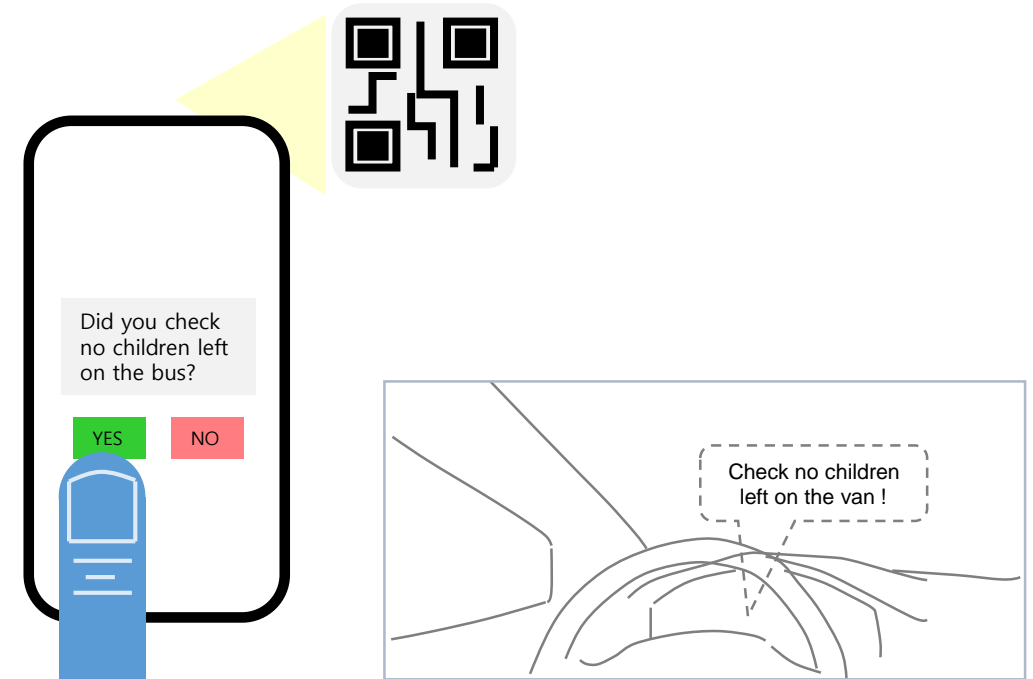
A. System for physical inspection

[Review point] Effectiveness: ▲

- **A-2 Reporting system**
 - requires the driver to report no children left on the bus after the end of the journey (to someone in charge of the operation, the driver, or database, etc.)

[Review point] Effectiveness: X

- **A-3 Reminder (indication)**
 - message to the driver after the end of a journey
 - encourages the driver to check **no children left on the bus**



* from the report "The trend of regulations and technologies of school buses (2022, in Korean)" of R&D project 'Technology development to improve the safety of Korean children's school buses' [RS-2022-00143581]

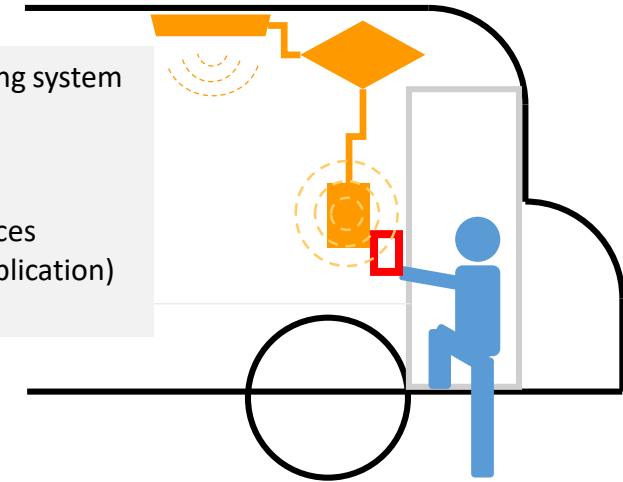
B. System for Indirect detection

[Review point] Accuracy: relatively high

- B-1 Active systems
 - Ingress & Egress monitoring system
 - Child occupants scan a QR code card, a RFID card, etc. in getting on or off the bus
 - the monitoring system detects tag-less beacons / personal mobile devices with child occupants getting on or off the bus
 - visual/audible warning or texting a person responsible for operating the bus if the system finds unloading child occupants
 - the monitoring system may share the locations of child occupants in real time

Ingress/Egress monitoring system

- QR code scan
- RFID card
- Tag-less beacon
- Personal mobile devices (e.g. smart phone application)
- Etc.



[QR code monitoring]

*source: Korea R&D report [RS-2022-00143581]



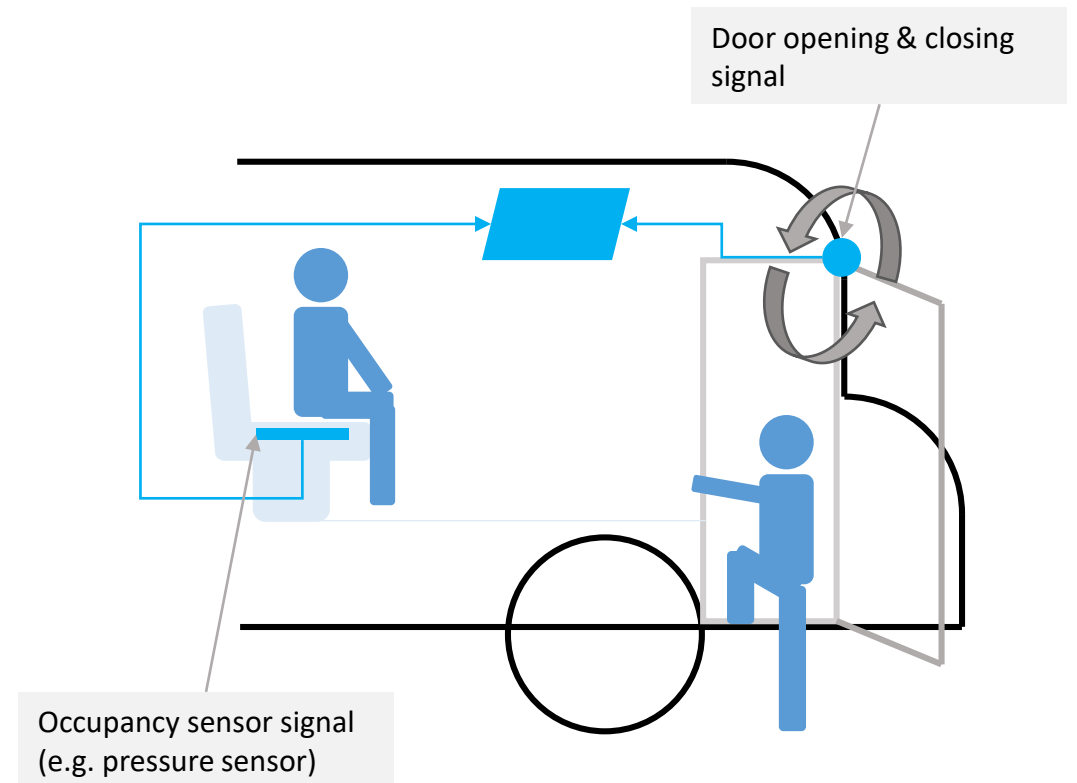
[Tag-less beacon]

*source: Korea R&D report [RS-2022-00143581]

B. System for Indirect detection

[Review point] Accuracy: low

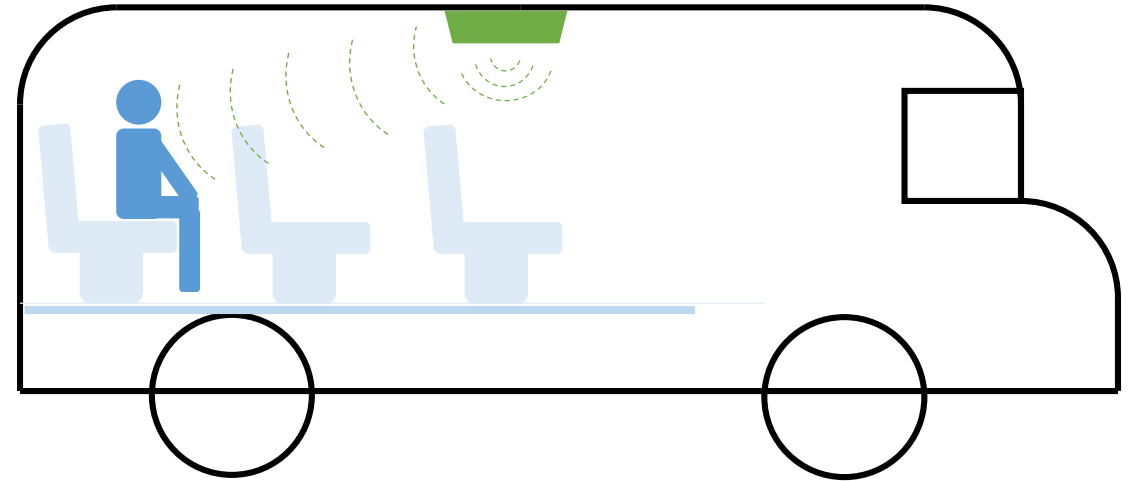
- B-2 Non-active systems
 - usually for a small passenger vehicle or van
 - by assumption of child presence based on door opening and closing
 - low accuracy
 - door opening & closing \neq passengers getting on & off
 - by assumption of child presence based on seat-occupancy
 - low accuracy
 - objects on seats may be recognizable by the occupancy sensor (e.g. pressure type sensor)



C. System for direct detection

[Review point] Maturity : introduced in the market

- C-1 Movement detection
 - radar sensor
 - high accuracy
 - high cost
 - ultrasonic sensor
 - lower cost (c.t. radar sensor)
 - affected by the environment
 - camera
 - in line with future tech trends (in-cabin monitoring)
 - blind spot (behind seat backs / if covered by a blanket)



[Direct Sensing System - Radar Sensors]
*source: CLEPA, IWG CLIV 5-13-Rev1e

Discussion on general requirements

Suggestion (based on the phase-1 agreement)

- A. system to have the drivers physically check there is no children left on the vehicles**
- B. system to indirectly detect left children on the vehicles**
- C. system to directly detect left children on the vehicles**

→ A / B / C / A&B / A&C / B&C / A&B&C

Buses shall be equipped with A, C, or any combination of 3 systems (A&B&C)

Discussion on general requirements

Systems and scenario coverage

category	A	B	C	A&B&C
A	Unknowingly			
B	Unknowingly knowingly	Unknowingly knowingly		
C	Unknowingly Knowingly Gained access	Unknowingly Knowingly Gained access	Unknowingly Knowingly Gained access	
A&B&C				Unknowingly Knowingly Gained access

* This applies to general situations, and may not applicable to special circumstances.

** It is just an initial thought for discussion (subject to be changed).

Further discussion on specific requirements and test procedures

- **Specific requirements**
 - **A: activation time & location & method**
 - **B: monitoring method information**
 - **C: detection coverage,**
 test tool specs (age, anthropometric, movement, human features,...)
 - **warning: to whom (driver, manager, persons around the vehicle)**
 , by what (visual, audible, messaging)
 , others (time, duration, volume), regulation conflicts
- **Test procedures**
 - **A: how to verify the fulfillment by checking the requirement**
 - **B: how to verify the fulfillment with the provided information**
 - **C: how to verify the fulfillment with the test tool**
 - **warning: how to measure or check**
- **Others**
 - **deactivation, heat-resistance, potential field complaints, etc.**

고맙습니다.
Thank you for your attention

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