

Intelligent Transport System – Roadside modules data interfaces Part 2 : Variable Message Sign(VMS)

2016. 10. 21.

한국지능형교통체계협회

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향후 계획

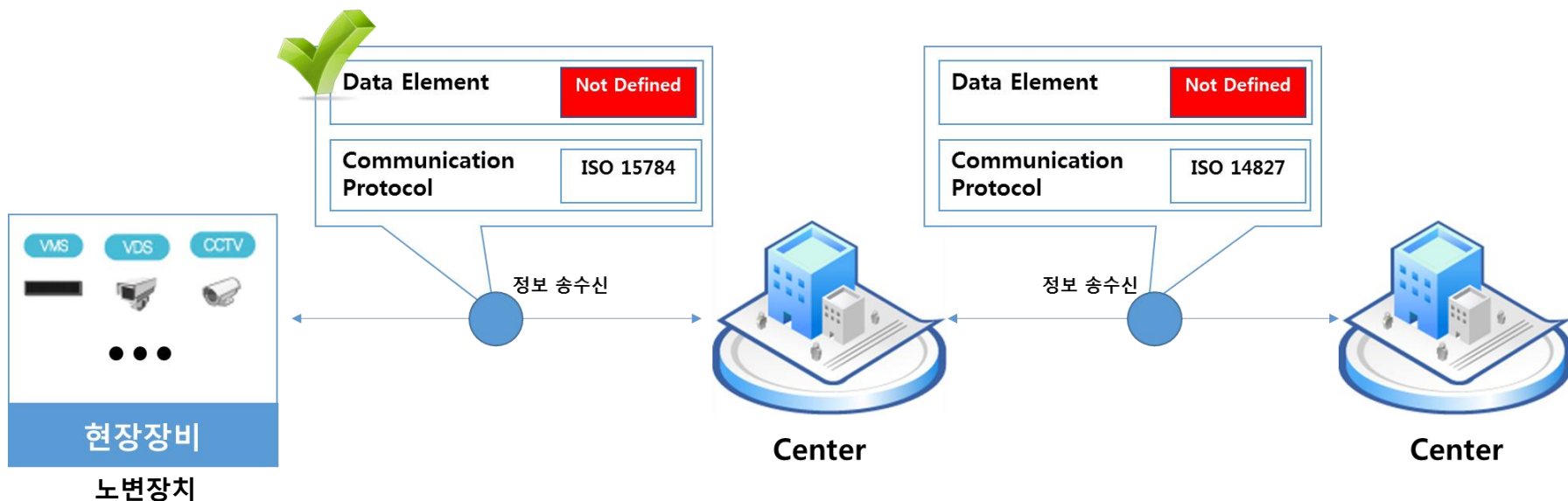


현황(1/3)



- WG 9는 교통정보와 교통제어 등 교통관리 분야에 대한 표준화를 담당하고 있음
- 특히, 교통정보 센터 간, 센터-노변 간, 노변 간 정보교환을 위한 통신절차 표준화를 진행 중에 있음(ISO 14827: 센터 간 / ISO 15784: 센터-노변, 노변 간)
- 하지만, ISO 14827과 15784는 정보교환을 위한 통신절차 표준이며, 송수신되는 정보를 정의한 표준은 없음

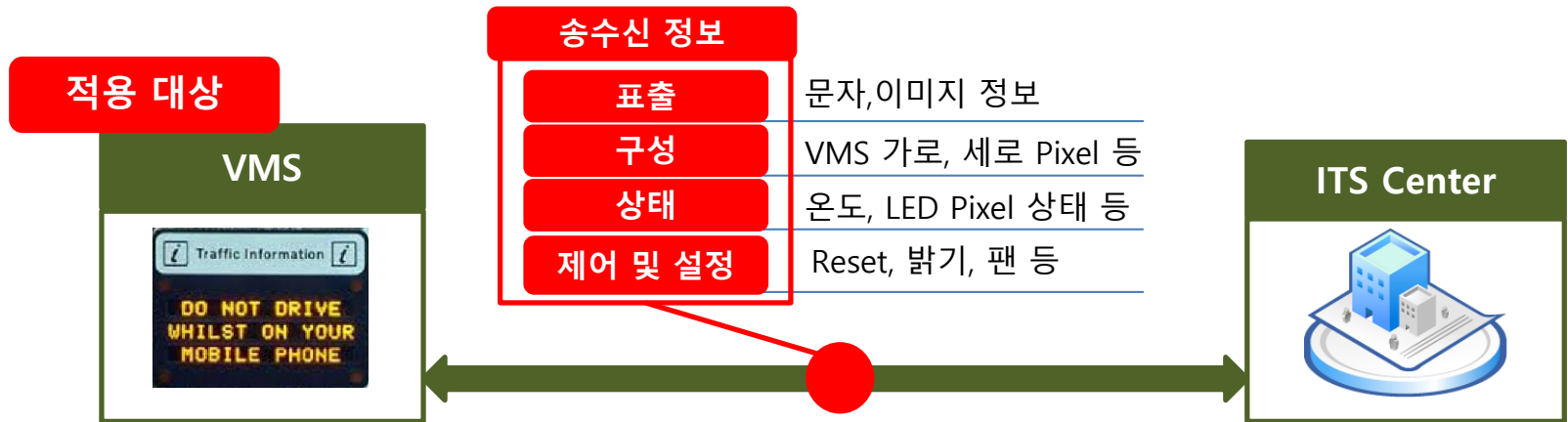
(반면, CEN은 센터 간 송수신되는 VMS와 Parking의 송수신 정보에 대한 표준을 개발하였고 이를 C-ITS Release 1으로 배포)



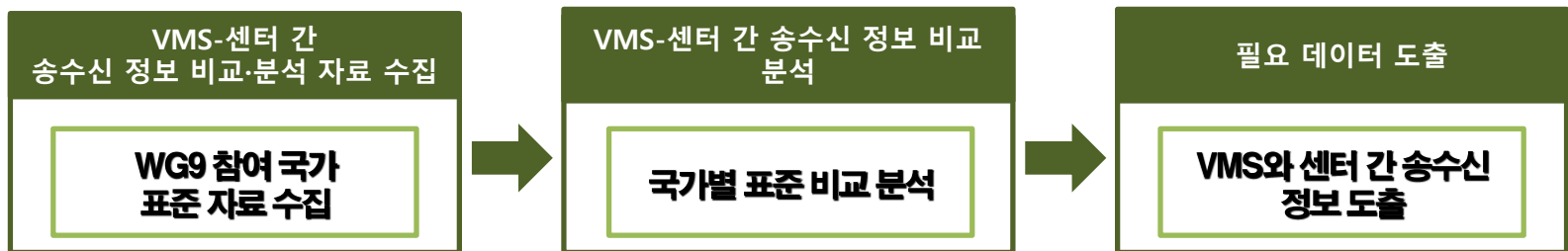
현황(2/3)



- 한국은 VMS에 대한 표준이 제정되어 있고, VMS가 원활하게 운영되고 있으므로 표준개발 방법을 VMS에 적용



- 표준개발방법





■ 이와 관련하여 노변장치와 센터 간 송수신 정보 표준(Roadside modules data interfaces)을 제안함



이전회의

- ✓ 제43회 오슬로, 제44회 벤쿠버
 - 노변장치와 센터 간 송수신 정보 정의 표준 필요성 발표
- ✓ 제45회 항주(중국)
 - 표준 Outline 발표
- ✓ 제46회 포츠담(독일)
 - 국가별 VMS 기능 조사 및 분석을 통한 VMS 공통기능 도출 발표
 - Form 4(표준제안서) 제출



제47회 콩코드(미국) 정기총회 (‘16. 4. 25 ~ 29)

- ✓ NP voting result report
 - NP투표: 승인 (8개국 찬성, 6개국 참여)
- ✓ VMS 공통기능 도출 (안)
- ✓ VMS 송수신 정보 도출 (안)



제48회 오클랜드(뉴질랜드) 정기총회 (‘16. 10. 3 ~ 7)

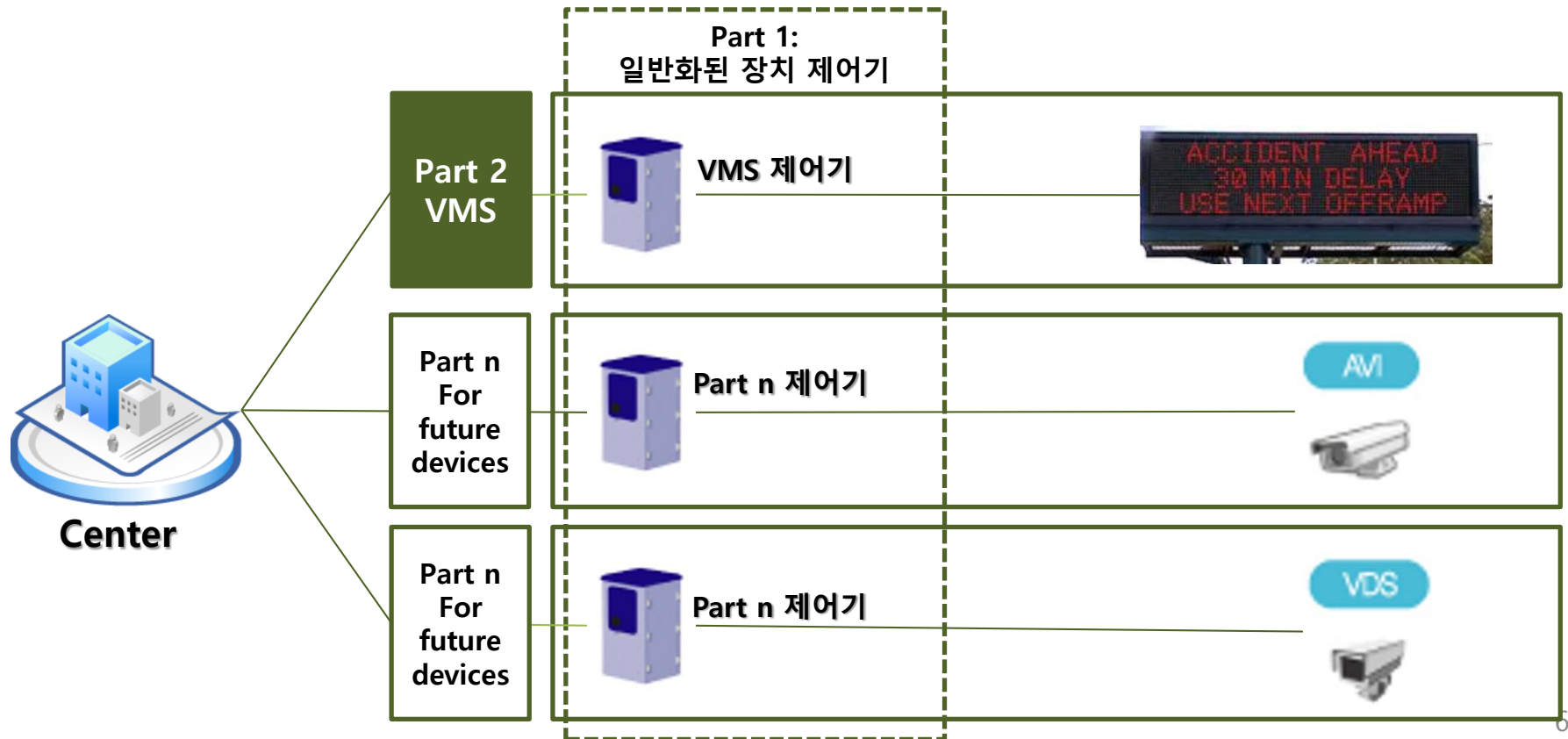
- ✓ VMS 공통기능 업데이트
- ✓ VMS 송수신 정보 도출 방법 논의

제안 표준 구성



■ (표준명) Intelligent Transport System - Roadside modules data interfaces

- (America) Part 1 : Generalized device controllers
- (Korea) Part 2 : Variable Message Sign(VMS)
- (Not define) Part 3-N: For future devices





Intelligent Transport System - Roadside modules data interfaces

Part 2 : Variable Message Sign (VMS)

■ Purpose

- 이 표준의 목적은 VMS와 ITS센터 간 송수신 정보를 정의하는 것임

■ Contents

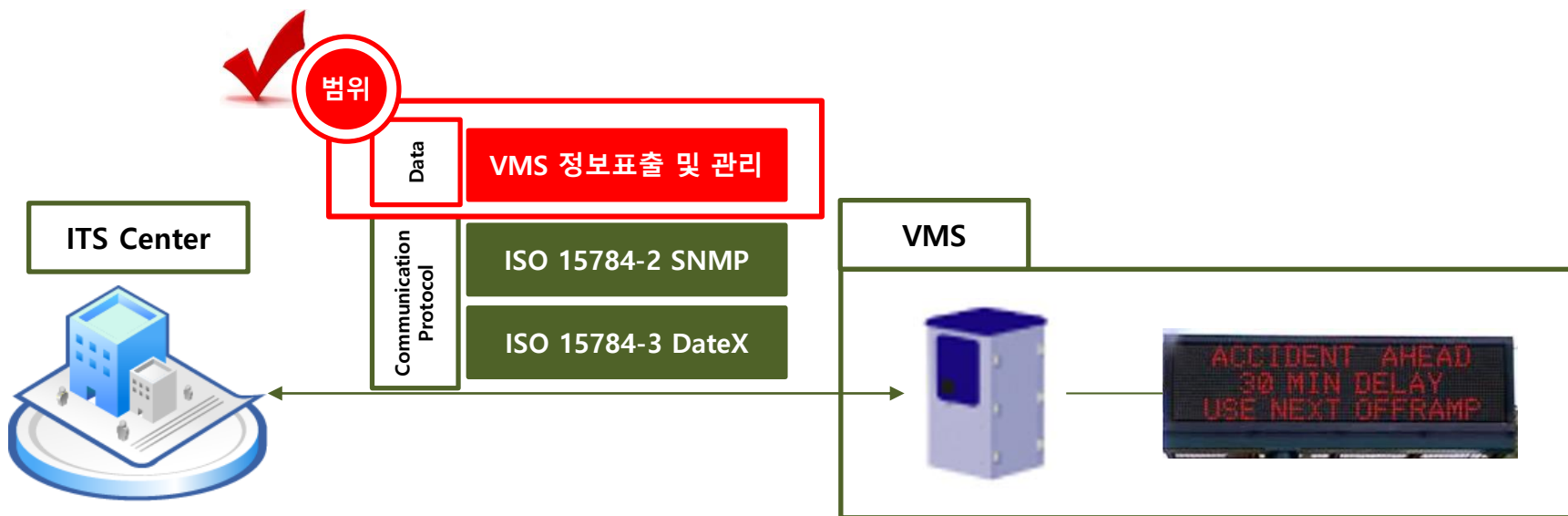
1. Scope (범위)
2. Normative references (참조표준)
3. Symbols and abbreviated terms (기호 및 약어 용어)
4. VMS Functions (VMS 기능)
5. Define Information Sent/Received between VMS and Centers (송수신 데이터 정의)
6. Information Exchange Scenario (정보교환 시나리오)
7. Annex (Definition of Information Sent/Received, Comparison of VMS Information of Each Country) (국가별 사례 정리)

표준 개요(2)



■ Scope

- 표준의 주요 범위, 적용 대상, 통신프로토콜에 대해 서술



- (주요범위) 이 국제표준은 VMS의 정보 표출 및 관리를 위한 정보 정의
- (적용 대상) 교통관리센터와 노변장치 간 정보 교환노변장치와 노변장치 간 정보 교환
- (통신 프로토콜) ISO 15784-2 (SNMP)와 ISO 15784-3 (DateX)

표준 대상 device 선정



다양한 기술이 적용된 VMS가 있으며, 모두 표준 대상에 포함해야 하는가?

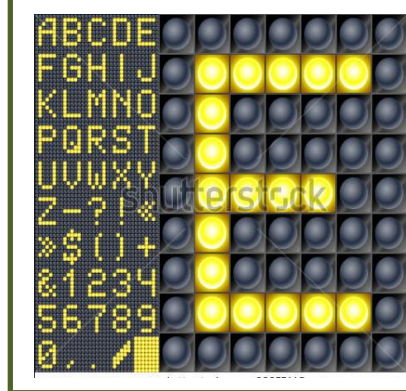
Fiber Optic



Flip disk or Shutter



Lamp matrix



LED



■ LED 기술이 실용화되어 있는 상태에서 Fiber Optic, Flip disk or Shutter, Lamp matrix 등을 이용한 VMS의 설치는 현실적으로 타당하지 않음.

- 예를 들면, LED, OLED TV가 있음에도 불구하고 브라운관 식 또는 진공관식 TV를 신규 구입하는 상황은 거의 없음

■ VMS와 센터 간 송수신 정보 정의 표준 대상을 LED 방식의 VMS로 한정하는 것을 제안함



■ Voting result summary








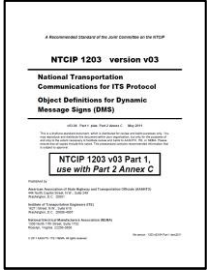




- Approval in WG9: 2015-10
- Start proposal: 2014-10-28, The 44th Vancouver meeting
- NP proposal: 2015-07-25 / Period : 2015-07-25 ~ 2015-10-25 (3 months)
- NP voting result: 승인 (8개국 찬성, 6개국 참여) → 통과조건 : 5개국 찬성, 5개국 참여

Country (Member body)	1a. Agree to add to work programme	3. Comments		4. Participation	
		Yes	No	Yes	No
Australia (SA)	X			X	
Canada (SCC)	X				X
Czech Republic (UNMZ)	X			X	
France (AFNOR)	X			X	
Japan (JISC)	X	X (3 comments)		X	
Korea, Republic of (KATS)	X			X	
Norway (SN)	X				X
United Kingdom (BSI)	X			X	
Totals	8	1		6	2

VMS 기능 조사 및 분석 (1/5)



국가별 VMS 표준 비교 분석을 통해 VMS 공통 기능 도출

					
ITSK-00087	NTCIP-1203	MRTS202,262 TSI-SP-003	NF P99-341	UTMC-TS004.006, 0661	UTMS B6A01110
					

VMS 공통 기능(안) 도출

VMS 표출	VMS 설정 및 제어	VMS 진단
<ul style="list-style-type: none"> ✓ VMS의 표출 정보 조정 기능 ✎ 이미지(텍스트) 표출 기능 ✎ 밝기조정 기능 	<ul style="list-style-type: none"> ✓ VMS 운영을 위해 필요한 설정 및 제어 기능 ✎ VMS 재부팅 기능 ✎ 팬 작동 기능 	<ul style="list-style-type: none"> ✓ VMS 상태 확인 및 자체 문제를 감지하여 센터에 전송하는 기능 ✎ 합체 온도 및 습도 진단 기능

VMS 기능 조사 및 분석 (2/5)



VMS 표출 : 도로 운영자 및 관리자가 운전자에게 다양한 정보를 제공하기 위해 VMS에 정보를 표출하는 기능



Activate and display a message

Display information by text and image in VMS.

Image Character

Define a message

Definition of message to display.

Font Position

Prioritize Message

Display by message priorities

L1 : Accident L2 : Road Env
ACCIDENT AHEAD TUNNEL CLOSED
ALT ROUTE US 6

L3 : Construction L4 : Parking
BARRIER MACHINE IN OPERATION
LANE 5 CLOSING CITY CENTRE
CAR PARKS BUSY USE
PARK AND RIDE

Blank a Sign

Remove any messages displayed on a sign

Sign LED error

Remove messages

Function	KR	US	AU	FR	JP1	JP2
Activate and display a message	X	X	X	X	X	-
Blank a sign	-	X	X	X	X	X
Schedule message for display	X	X	X	-	-	-
Change Message Display Based on an Internal Event	X	X	X	X	X	-
Prioritize Message	-	X	-	-	-	-
Define a message	-	X	X	X	X	X

Schedule Messages for Display

Display messages on the Sign depending on schedule.

On-Peak Hours Off-Peak Hours

Change Message Display Based on an Internal Event

Message automatically displayed when an event occurs (no communication, power failure)

Usually Communication Disruptions

* JP 1 : Ordinary Roads / JP 2 : Expressway

** United Kingdom's VMS Function was not received yet

VMS 기능 조사 및 분석 (3/5)



VMS 설정 및 제어 : 도로 운영자 및 관리자가 VMS 운영에 필요한 정보를 설정하거나 제어 하는 기능



Configuration
Define the VMS Identity

VMS System Version and Date Information

WORKFORCE ON SLIP ROAD

Version : 1.01 Date : '15.10.13

Configuration
Collect VMS parameter information

Collect VMS Parameter Information

Fan operation temperature Time

Heater operation temperature

Configuration
VMS Parameter information Set

Set VMS Parameter Information

Fan operation temperature Time

Heater operation temperature

Function	KR	US	AU	FR	JP1	JP2
Determine the VMS Identity	X	X	X	X	-	-
Collect VMS parameter information	X	-	X	X	X	X
VMS Parameter information Setting	X	-	X	X	-	-
Perform Preventative Maintenance	-	X	X	-	-	-
Determine Sign Display Capabilities	X	X	X	-	X	-
Manage fonts	X	X	X	X	X	-
Manage graphics	X	X	X	-	X	X

Configuration
Perform Preventative Maintenance

Set VMS test time and frequency

Self-test time and frequency

Configuration
Determine Sign Display Capabilities

The detailed physical limitations of the DMS

Sign Height

Sign Width

Configuration
Manage fonts

Manage a fonts displayed a sign

Font name, Font ID
Font Size etc...

Configuration
Manage graphics

Manage graphics stored in VMS

Graphic name, Graphic size, height, width etc...

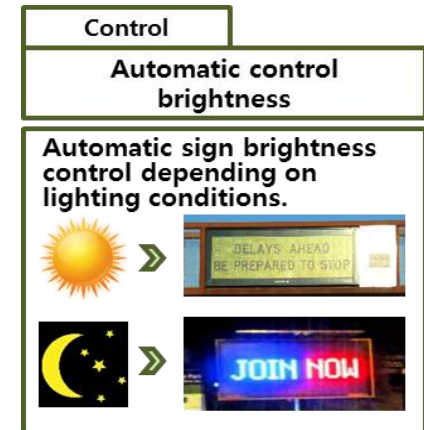
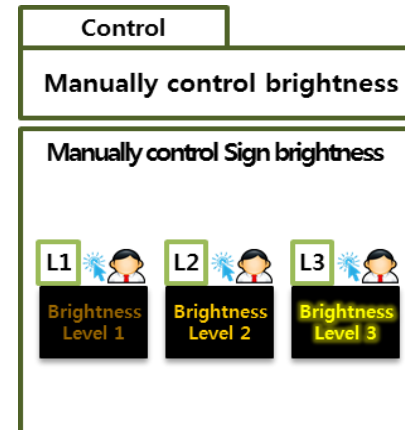
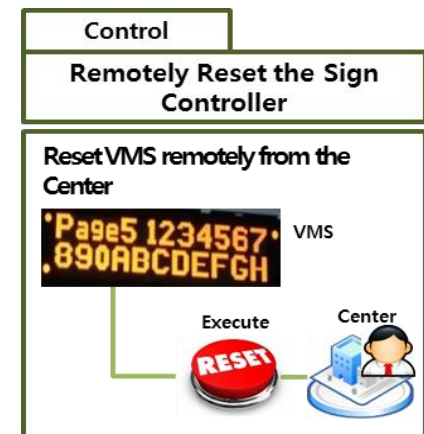
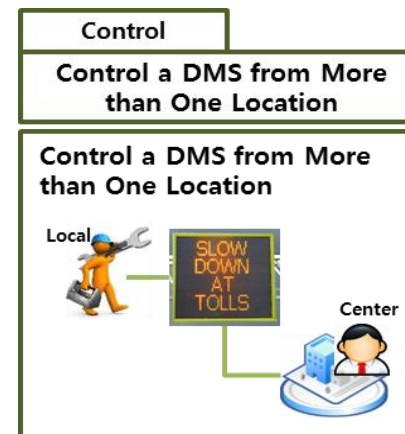
VMS 기능 조사 및 분석 (4/5)



VMS 설정 및 제어 : 도로 운영자 및 관리자가 **VMS** 운영에 필요한 정보를 설정하거나 제어 하는 기능



Function	KR	US	AU	FR	JP1	JP2
Control a VMS from More than One Location	-	x	x	-	x	-
Remotely Reset the Sign Controller	x	x	x	X	-	-
Control the brightness output	x	x	x	X	-	X
Automatic control brightness	x	x	x	-	x	x



VMS 기능 조사 및 분석 (5/5)



VMS 진단 : 도로 운영자 및 관리자가 VMS 상태를 확인하거나 오류 발생 여부를 진단하는 기능

Function	KR	US	AU	FR	JP1	JP2
Monitor Sign Environment	x	x	x	-	x	-
VMS Current Status	x	x	x	x	x	x
Monitor the Current Message	x	x	x	x	x	x
Determine Sign Error Conditions	x	x	x	x	x	x
Monitor Controller Software Operation	-	x	x	x	-	-
Monitor Automatic Blanking of Sign	-	x	x	x	x	-
Monitor Power Source	-	x	x	-	-	x
Monitor power voltage	-	x	x	-	-	-
Monitor fuel level	-	x	-	-	-	-
Monitor engine RPM	-	x	-	-	-	-
Configure low fuel threshold	-	x	-	-	-	-
Monitor message error	-	x	x	-	x	x
File download	x	-	x	-	-	-

Monitor Sign Environment

Temperature/humidity in VMS, ambient temperature

Temperature

Humidity



VMS Current Status

Current VMS Status Information

Door

Fan



Monitor the Current Message

Monitor currently displayed VMS

The sign

Image File

Center



Determine Sign Error Conditions

VMS self-test



Monitor Controller Software Operation

Monitor normal operation of S/W



Monitor Automatic Blanking of Sign

Automatically delete messages when impossible to operate VMS

Error

Automatic

Remove



Monitor Power Source

Monitor power source

Fuel generator

Solar heat



Power Source Information

Other information related to power

Voltage

Fuel Level

RPM



Other Functions



Monitor message error



Download file

VMS 송수신 정보 비교 분석



Determine the VMS Identity



Functional requirement	NTCIP-1203				
	Parameter name	Syntax	Range	Access	Status
Determine Sign Type and Technology	dmsSignType	INTEGER	other (1), bos (2), cms (3), vmsChar (4), vmsLine (5), vmsFull (6), portableOther (129), portableBOS (130), portableCMS (131), portableVMSChar (132), portableVMSLine (133), portableVMSFull (134)	read-only	mandatory
	dmsSignTechnology	INTEGER	0..65535	read-only	mandatory
Determine Device Component Information	globalMaxModules	INTEGER	1..255	read-only	mandatory
	moduleNumber	INTEGER	1..255	read-only	mandatory
	moduleDeviceNode	OBJECT IDENTIFIER	-	read-only	mandatory
	moduleMake	OCTET STRING	-	read-only	mandatory
	moduleModel	OCTET STRING	-	read-only	mandatory
	moduleVersion	OCTET STRING	-	read-only	mandatory
Determine Supported Standards	moduleType	INTEGER	other (1), hardware (2), software (3)	read-only	mandatory
	controllerBaseStandards	OCTET STRING	SIZE (0..256)	read-only	mandatory

VMS 송수신 정보 비교분석



Determine the VMS Identity



Functional requirement	ITSK-00087				
	Parameter name	Syntax	Range	Access	Status
VMS System Version Information	dymsVmsSvimVersionMajor	INTEGER		read-only	optional
	dymsVmsSvimVersionMinor	INTEGER		read-only	optional
	dymsVmsSvimVersionModify	INTEGER		read-only	optional
	dymsVmsSvimVersionBuild	INTEGER		read-only	optional
	dymsVmsSvimVersionDateTime	GeneralizedTime		read-only	mandatory
	dymsVmsSvimVersionReleaseDate	GeneralizedTime		read-only	optional



동일한 목적의 기능이지만, 세부 data elements는 많이 다름

VMS 송수신 정보 비교분석



Remotely Reset the Sign Controller



Functional requirement	NTCIP-1203				
	Parameter name	Syntax	Range	Access	Status
Reset the Sign Controller	dmsSWReset	INTEGER	0..1	read-write	mandatory





Functional requirement	ITSK-00087				
	Parameter name	Syntax	Range	Access	Status
VMS Parameter Set	dymSVmsCastReset	INTEGER	-	read-write	optional



반면, 세부 data element가 거의 동일한 기능도 있음



VMS 송수신 정보 비교분석



Function		 U.S. (NTCIP-1203)	 Korea (ITSK-00087)
Determine the VMS Identity	Determine Sign Type and Technology		-
	Determine Device Component Information	VMS System Version Information	
	Determine Supported Standards		-
Determine Sign Display Capabilities	Determine the Size of the Sign Face		-
	Determine the Size of the Sign Border		-
	Determine Beacon Type		-
	Determine Sign Access and Legend		-
	Determine Sign Face Size in Pixels	VMS Led Pixel Status	
	Determine Character Size in Pixels		-
	Determine Pixel Spacing		-
	Determine Maximum Number of Pages		-



VMS 송수신 정보 비교분석



Function		 U.S. (NTCIP-1203)	 Korea (ITSK-00087)
VMS Setting and Control	Determine Sign Display Capabilities	Determine Maximum Message Length	-
		Determine Supported Color Schemes	-
		Determine Message Display Capabilities	-
		Determine Maximum Number of Fonts Supported	-
		Determine Maximum Number of Characters per Font	-
		Retrieve a Font Definition	VMS Form Object Text
		Determine Maximum Number of Graphics	-
		Retrieve a Graphic Definition	VMS Od* Image Data Entry (* Od : Object data)
		Determine Default Message Display Parameters	-
		Monitor Information about the Currently Displayed Message	-
		Monitor Dynamic Field Values	-



VMS 송수신 정보 비교분석



Function		 U.S. (NTCIP-1203)	 Korea (ITSK-00087)
VMS Setting and Control	Manage fonts	Determine Maximum Number of Fonts Supported	-
		Determine Maximum Character Size	-
		Determine Maximum Number of Characters per Font	-
		Retrieve a Font Definition	VMS Form Object Text
		Delete a Font	-
		Validate a Font	-
	Manage graphics	Determine Maximum Number of Graphics	-
		Determine Maximum Graphic Size	-
		Determine Available Graphics Memory	-
		Retrieve a Graphic Definition	VMS Od* Image Data Entry (* Od : Object data)
		Store a Graphic Definition	VMS Od* Image Data Entry (* Od : Object data)



VMS 송수신 정보 비교분석



Function		 U.S. (NTCIP-1203)	 Korea (ITSK-00087)
VMS Setting and Control	Manage graphics	Delete a Graphic	-
		Validate a Graphic	-
	Remotely Reset the Sign Controller	Reset the Sign Controller	VMS Parameter Set
	Manually control brightness	Determine Number of Brightness Levels	Bright Manual Value
		Determine Current Photocell Readings	-
		Manually Direct-Control Brightness	-
		Manually Index-Control Brightness	-
		Manually Control Brightness	-
		Switch Brightness Control Modes	VMS Bright Control Mode


VMS 송수신 정보 비교분석



VMS Setting and Control	Function	 U.S. (NTCIP-1203)	 Korea (ITSK-00087)
	Automatic brightness	Determine Maximum Number of Light Sensor Levels	-
		Configure Light Output Algorithm	-
		Determine Current Light Output Algorithm	-
		Determine Number of Brightness Levels	-
		-	Bright Daytime Mode Value
		-	Bright Night Mode Value
VMS Display	Activate and display a message	Activate a Message	VMS Display Scenario
		Retrieve Message	VMS Local Form Upload
		Activate a Message with Status	-



VMS 송수신 정보 비교분석



Function		 U.S. (NTCIP-1203)	 Korea (ITSK-00087)
VMS Display	Schedule message for display	Activate a Message	VMS Display Scenario
		Retrieve a Schedule	VMS Local Form Upload
		Define a Schedule	VMS Display Scenario
		Activate a Message with Status	-
		Set Time	
		Set Time Zone	
		Set Daylight Savings Mode	
		Verify Current Time	
		Determine Maximum Number of Schedules	
		Monitor Current Schedule	



VMS 송수신 정보 비교분석



Function		 U.S. (NTCIP-1203)	 Korea (ITSK-00087)
VMS Display	Change message display based on an internal event	Configure Message for Short Power Loss Recovery Event	-
		Configure Message for Long Power Loss Recovery Event	-
		Configure Message for Power Loss Event	-
		Configure Message for Controller Reset Event	-
		Configure Message for Communications Loss Event	-
		Configure Message for End Message Display Duration Event	-
		Monitor Short Power Recovery Message	-
		Monitor Long Power Recovery Message	-
		Monitor Power Loss Message	-
		Monitor Reset Message	-
		Monitor Communications Loss Message	VMS Default Form, VMS Parameter Set
		Monitor End Duration Message	-

VMS 송수신 정보 비교분석



Function		 U.S. (NTCIP-1203)	 Korea (ITSK-00087)
VMS Monitor	Monitor Sign Environment	Monitor Sign Housing Temperatures	VMS Current Status
		Monitor Sign Housing Humidity	VMS Current Status
		Monitor Control Cabinet Temperatures	VMS Current Status
		Monitor Control Cabinet Humidity	VMS Current Status
		Monitor Ambient Environment	VMS Current Status
	Monitor the Current Message	Monitor Information about the Currently Displayed Message	VMS Display Still Image
		Monitor Dynamic Field Values	-
	Determine Sign Error Conditions	Execute Lamp Testing	-
		Activate Pixel Testing	VMS Led Pixel Status
		Execute Climate-Control Equipment Testing	-
		Provide General DMS Error Status Information	-

VMS 송수신 정보 비교분석



The difficulty example

Function	ITSK-00087	NTCIP-1203
Remotely Reset the Sign Controller	dyms-Reset BOOLEAN - 0 : reset - 1 : no reset	INTEGER (0..1) - 0 : reset - 1 : no reset
VMS diagnosis	dyms-ModuleErrorFindSetting INTEGER (0..100)	Determine Sign Error Conditions (High-Level Diagnostics) Monitor Sign Subsystem Failures (Mid-Level Diagnostics) Monitor Subsystem Failure Details (Low-Level Diagnostics)



We are researching efficiency method
each country VMS standard.





■ Road Map Roadside modules data interfaces (Part 2 : Variable Message Sign)

Classification	2016	2017	2018
NP			
CD			
DTR			
Publication			

■ Standardization for future device

- Discussion is required to develop standard for defining information sent/received between various RSE (AVI, VDS) and the Center IN WG9 in addition to VMS.



THANK YOU