Products for Vehicles
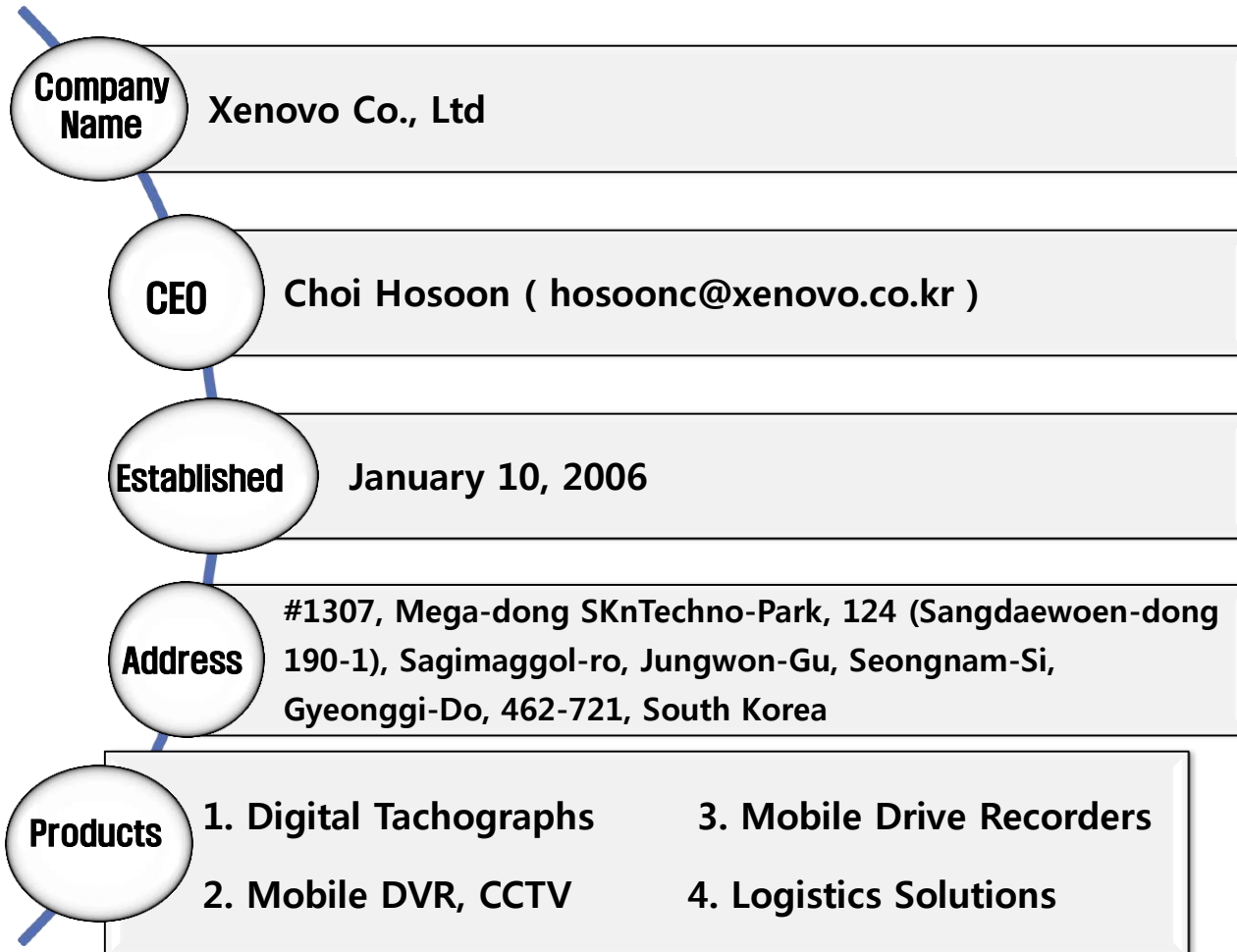
Xenovo Co.,Ltd.
www.xenovo.co.kr

CONTENTS

Ⅰ. Introduction to XENOVO

Ⅱ. Products

- Digital Tachographs

- Mobile Digital Video Recorders

- Logistics Solutions

Ⅰ. INTRODUCTION

1. About us

Company Name: Xenovo Co., Ltd

CEO: Choi Hosoon (hosoonc@xenovo.co.kr)

Established: January 10, 2006

Address: #1307, Mega-dong SKnTechno-Park, 124 (Sangdaewoen-dong 190-1), Sagimaggol-ro, Jungwon-Gu, Seongnam-Si, Gyeonggi-Do, 462-721, South Korea

Products:
1. Digital Tachographs
2. Mobile DVR, CCTV
3. Mobile Drive Recorders
4. Logistics Solutions

Ⅰ. INTRODUCTION

2. History

2014.08	The Best Device for Eco Friendly Driving (Tachographs), Seoul. Top Award.
2013.12	CJ Korea Express Integrated Terminal Supply and Installation Contract
2013.10	Supply Contract of 1,658 DVR (CCTV) for Daegu Metro Buses
2013.05	CCTV Supply Contract (Vladivostok, Russia)
2013.02	Fuel Flow Meters (DFM) Supply Contract with Technoton (Republic of Belarus)
2012.12	Supply Contract of Digital Tachographs (Wi-Fi) for Seoul Metro Buses
2012.06	Seoul ECO Driving Device (Digital Tachographs) Best Choice / Supply Completed Wi-Fi (12.12.17)
2012.05	Registered as a Venture Company
2011.12	Authorization of the Research Lab Affiliated with Xenovo
2011.04	Developed "CoolGuardian System" for CJGLS (Temperature/Humidity Control Device: Support USB, Wi-Fi, CDMA, and ZigBee; Sensor: Support ZigBee)
2011.03	Supply Contract of 1,000 DVR and Digital Tacographs (Wi-Fi) for Daejeon Metro Buses
2010.12	Developed 6-Channel H.264 DVR
2010.08	Developed TSA Standard Digital Tachograph and Operation System V3 (Complementary WiFi function)
2010.05	Developed 2-Channel Mobile Drive Recorder
2009.02	Developed Digital Tachograph and Operation System (DVR function)
2006.12	Developed Utility Software (Win CE Player, Viewer)
2006.01	Established Xenovo Co., Ltd.

Ⅰ. INTRODUCTION

3. Technology

Category	Technology	Related Products
Hardware	① Embedded System Design & Devel. ② Wi-Fi Module Application ③ Zigbee Module Application ④ Analog/Digital Sensor Application	① Digital Tachograph ② DVR System for Vehicles ③ DMB Box for Vehicles ④ Location Control System with ZigBee
Software	① MS Windows Application Devel. ② Server Daemon Design & Devel. ③ DB Design & Development ④ XML Design & Development ⑤ Network & Communication Interface	① Navigation Application ② Driving Data Collector & Analysis System ③ Robot Control S/W with XML ④ Metal Mask Creation S/W

Ⅰ. INTRODUCTION

4. Products

① Digital Tachograph

- ❖ Patent Technology Product for Vehicles
- ❖ Korean Govn. Standards (MLTM)
- ❖ Multiple Models (USB, WIFI, CDMA)
- ❖ DVR(CCTV) Based Tachograph Available
- ❖ Driving Analysis System Support
- ❖ 1 sec Data Storage: 6 months+

③ 2CH Mobile Drive Recorder

- ❖ Video: AVI H.264
- ❖ 2 Channels
- ❖ 4" TFT LCD
- ❖ Built-in Wi-Fi Module
- ❖ Exclusive Mobile App Support (Android/iOS)
- ❖ Micro SD Memory (16GB/32GB)

② Mobile 8CH HD DVR

- ❖ H.264 Codec
- ❖ Front HD Camera
- ❖ Compatible with Tachograph
- ❖ Video Input/Output: 8CH/1CH
- ❖ XVR-1000: 1CH (HD), 3CH (D1), 4CH (CIF)
  XVR-2000: 1CH (HD)/ 3CH (VGA) / 4CH (QVGA)
- ❖ Resolution: 1280×720, 720×480
- ❖ HDD, SD Backup Recording
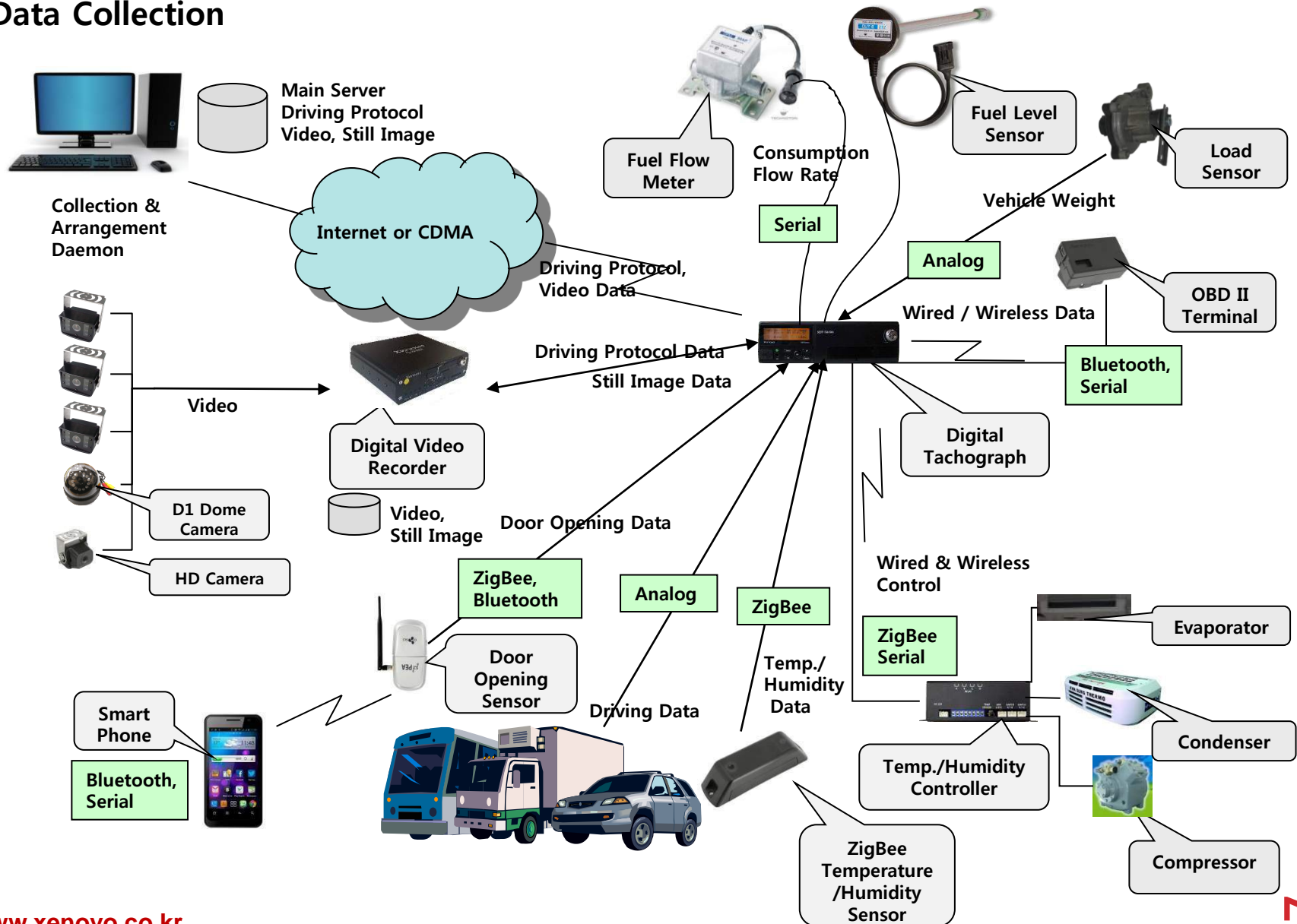- ❖ Ruggedized Design Suitable for Vehicles

④ Logistics Solutions

- ❖ Fuel Flow Meter
- ❖ Temperature/Humidity Sensor
- ❖ Control Doors (Open/Close)
- ❖ Freezer Controller
- ※ Compatible with Tachograph

Products

Ⅰ. INTRODUCTION

5. Data Collection

Main Server
Driving Protocol
Video, Still Image

Collection & Arrangement Daemon

Internet or CDMA

Fuel Flow Meter

Consumption Flow Rate

Fuel Level Sensor

Load Sensor

Serial

Vehicle Weight

Analog

Driving Protocol, Video Data

Wired / Wireless Data

OBD II Terminal

Driving Protocol Data

Still Image Data

Bluetooth, Serial

Video

Digital Tachograph

Digital Video Recorder

Video, Still Image

Door Opening Data

D1 Dome Camera

HD Camera

ZigBee, Bluetooth

Analog

ZigBee

Wired & Wireless Control

Evaporator

ZigBee Serial

Door Opening Sensor

Temp./ Humidity Data

Smart Phone

Driving Data

Temp./Humidity Controller

Condenser

Bluetooth, Serial

ZigBee Temperature /Humidity Sensor

Compressor

Ⅱ-1. Digital Tachograph

1. Purpose of a Digital Tachograph

Safe and Efficient Driving Management System

Safe Driving

- Prevention of Sudden Accelerations, Brake
- Collection of Accident Evidences
- Safety Measures for Passengers
- Safe Driving Education References

Efficient Management

- Leading Solution for Eco-Driving (Increased Lifespan & Fuel Efficiency)
- Efficient Bus/Truck Management
- Reduction of Work by Efficient Wireless Data Processing
- Real-time Management Capability
- Management of Driver's Working Hours & Attendance

Ⅱ-1. DIGITAL TACHOGRAPH

Xenovo

2. Introduction

Design
※ Set Shield to Protect from Dust & Vibration
※ Flexible Port for External I/O
※ Thermal Resistant ABS Material
※ Simple and Easy Set-Up

Software
※ Data Storage for 6 Months+
※ Data Cycle 1 sec
※ Effective Driving Record Management

Hardware
※ MLTM Standards
※ FCC/CE/MIC Certified Standards
※ Process Driving Data (Speed, Distance, Time, RPM, etc.)
※ Wireless Function

Peripheral Interface
※ Connect to I/O, CAN, GPS, G-Sensor, etc.
※ CDMA Module Available
※ Recognize Driver Tag when with RFid Option
※ Interworking with DVR

10

www.xenovo.co.kr

Ⅱ-1. DIGITAL TACHOGRAPH

3. Models

Type	Standard Models		All in One Model
	USB Type	**Wi-Fi Type**	
Spec.	MLTM Standards, Individual Data Collection(USB)	Data Collection (Wi-Fi)	All in One with DVR(CCTV)
Features	① Time, Speed, RPM, Brake ② Auxiliary Input Data Processing ③ Data Cycle: 1 second / Data Storage: 6 months+ ④ GPS Standard ⑤ Driving Analysis ⑥ Multiple Interfaces	Same as on the left ⑦ Feasible to Collect Data from Multiple Vehicles ⑧ Remote Control Monitoring	Same as on the left ⑦ Interlocking with Driving & Video Records ⑧ Up to 4 cameras
Image			

Ⅱ-1. DIGITAL TACHOGRAPH
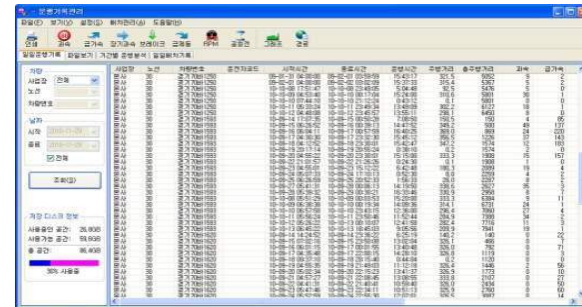
Xenovo

4. Hardware

Category	Specification
CPU	32bit RISC
Memory (ROM/RAM)	4G/128K
Display	LCD 128×32 DOT
External Memory	USB disk 32GB
Operat Voltage, Max Current	DC 10~36V (free voltage) / 300mA
Operat Temp/ Storage Temp	-20℃~+80℃ / -40℃~+85℃
Data Collection Cycle	1.0 sec (standard)
Distance Data Range	0 ~ 9,999,999 Km
Speed Data Range, Accuracy	0 ~ 255Km/h / ± 1Km/h
Size	138(L) × 107(W) × 35(H)mm (On-dash)
	180(L) X 157(W) X 50(H)mm (1-DIN)
Data Transmission Port	USB, RS232, CAN / Bluetooth, Zigbee (Option)
Wi-Fi Function	○
Rfid Function	Option
Built-in DVR Function	Option
External DVR interface	○
Buzzer	○
GPS	External G-mouse type

www.xenovo.co.kr

12

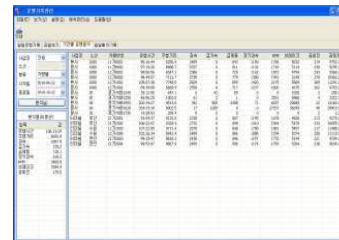# Ⅱ-1. DIGITAL TACHOGRAPH

5. Driving Analysis System S/W

1) Daily Driving Status Analysis

① Driving Records of Each Office/Unit, Route, Vehicle, and Driver
② Advanced Search Tool: Search Keywords (Office/Unit, Route, Vehicle Number, Date, Etc.)
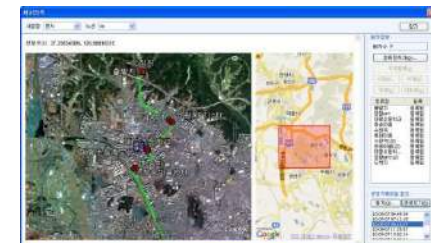③ Graphs and Charts
④ Various Output Formats

2) Periodical Analysis

① Periodical Analysis of Each Search Keyword
② Detailed Analysis of Driving Categories
③ Graphs and Charts
④ Average Value Calculation

3) Allocation Control

① Departing Point, Arriving Point, Departing and Arriving Time at Each Bus Stop
② Gives Information about Bus Allocation & Interval
③ Bus Routes and Bus Allocation Shown on the Map
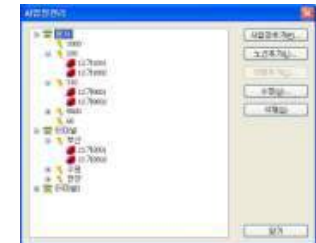
www.xenovo.co.kr

Ⅱ-1. DIGITAL TACHOGRAPH

4) Driving Path Analysis

① Analysis of Speed, RPM, Acceleration, Long-Term Acceleration, Sudden Acceleration, Sudden Brake, Idling
② Driving Data of Each Vehicle, Driver, Route, and Business Office/Unit

5) Various Configurations

① Data Analysis of Each Business Office/Unit, Route, and Vehicle
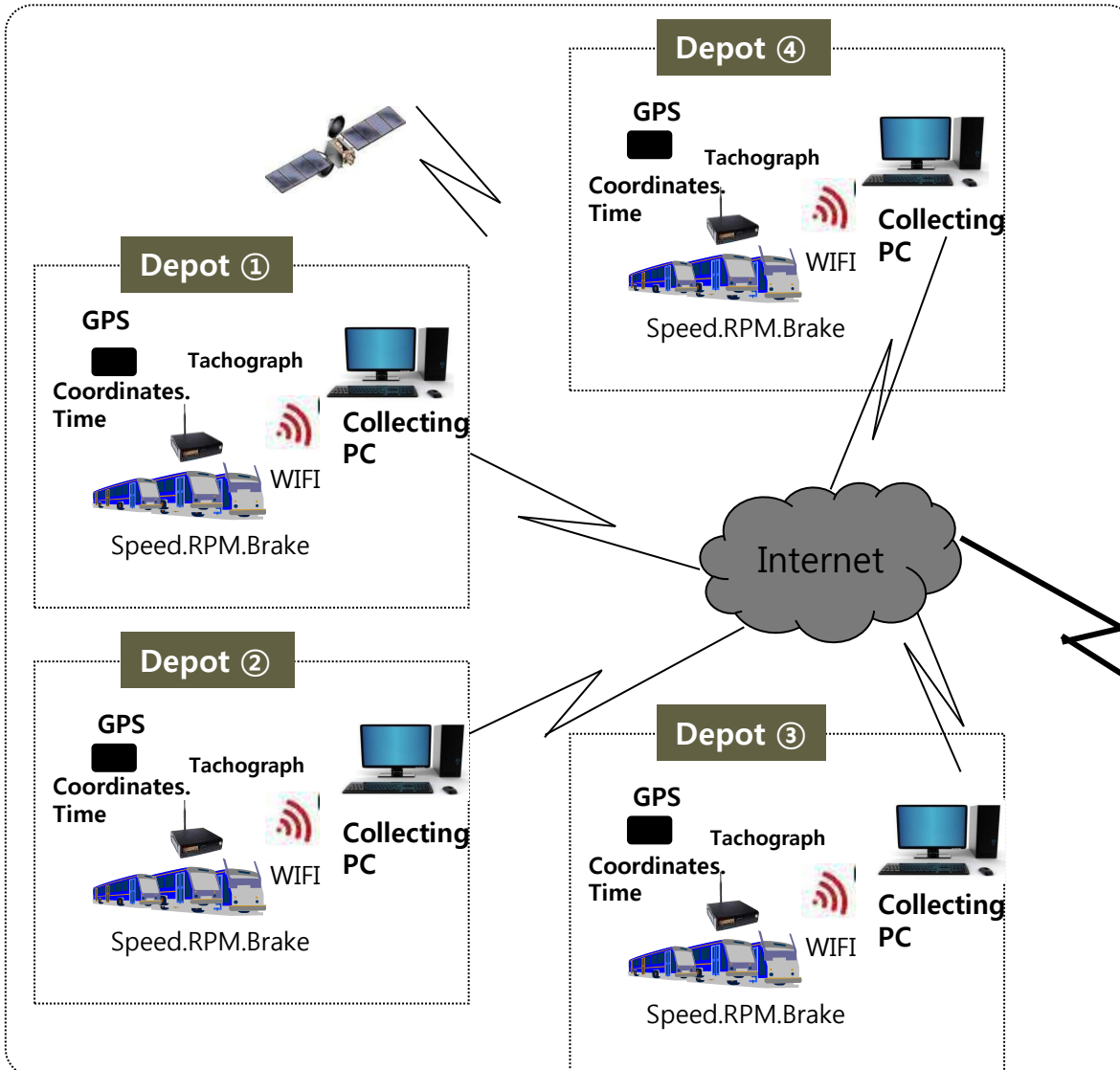② Configuration of Evaluation Terms for Each Route
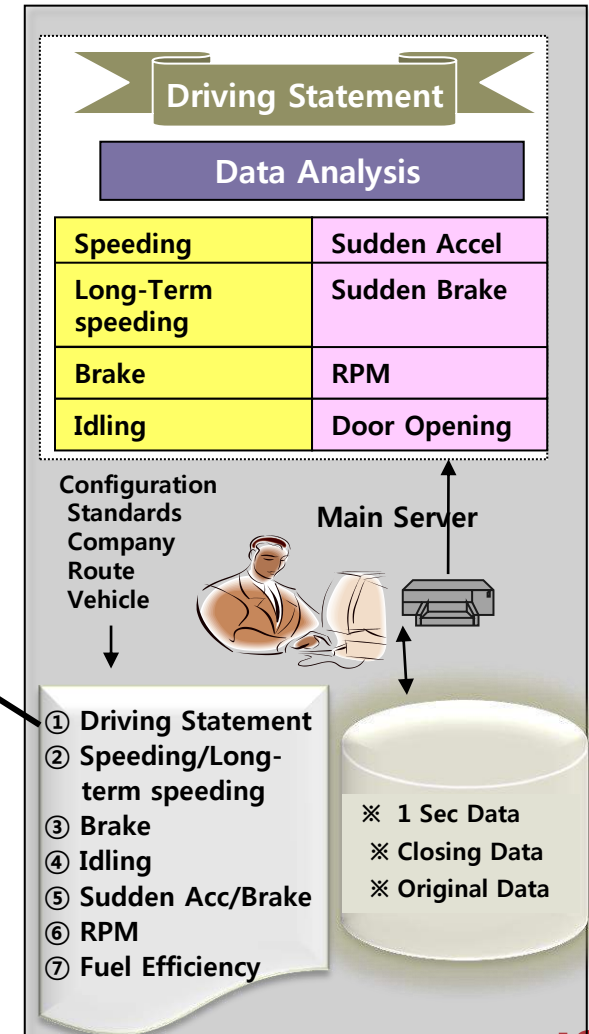
6) Data Submitted to Korea Transportation Safety Authority

① Comply with the Submission Standards
② Download Available for Self Data Modification

Ⅱ-1. DIGITAL TACHOGRAPH

Xenovo

6. System Structure

Driving Analysis (Main Office)

Depot ④

GPS

Tachograph

Coordinates.
Time

Collecting PC

WIFI

Speed.RPM.Brake

Depot ①

GPS

Tachograph

Coordinates.
Time

Collecting PC

WIFI

Speed.RPM.Brake

Depot ②

GPS

Tachograph

Coordinates.
Time

Collecting PC

WIFI

Speed.RPM.Brake

Depot ③

GPS

Tachograph

Coordinates.
Time

Collecting PC

WIFI

Speed.RPM.Brake

Internet

Driving Statement

Data Analysis

Speeding	Sudden Accel
Long-Term speeding	Sudden Brake
Brake	RPM
Idling	Door Opening

Configuration
Standards
Company
Route
Vehicle

Main Server

① Driving Statement
② Speeding/Long-term speeding
③ Brake
④ Idling
⑤ Sudden Acc/Brake
⑥ RPM
⑦ Fuel Efficiency

※ 1 Sec Data
※ Closing Data
※ Original Data

15

Ⅱ-2. Mobile DVR

Ⅱ-2. MOBILE DVR

1. Purpose

Safe and Efficient System for Driving

- ✓ **Service Improvement: Driving Habit, Driver Attitude towards Passengers**

- ✓ **Protection of Passengers and Drivers during Night-time**

- ✓ **Crime Prevention and Protection of Women, Children, and the Elderly**

- ✓ **Protection of Rights of Drivers and Passengers and Prevention of Any Time Waste by Providing Accurate Data of Accidents**

- ✓ **Establishment of System that Links BIMS and Transportation Cards**

Passengers

※ Desire for Service Improvement

※ Anxiety about Possible Accidents

※ Safety during Night-time

Transportation Companies

※ Improvement of Driving Habit of Drivers

※ Accurate Data for Future Accidents

※ Improved Service and Resulting Increase in Passengers

Government

※ Quality Improvement of Public Transportation Service

※ Social Cost of Traffic Jam

※ Linkage with Other Traffic Systems and Establishment of General Traffic Information System

2. Introduction to Mobile DVR

Design

- Digital Tachograph Integrated Design
- LCD, LED for Easer DVR Status Control
- DVR Multipurpose Cover & HDD LOCK
- 1 DIN, Suitable for All Vehicles

Hardware

- FCC/CE/MIC Certified Standards
- Unusual Power Supply and Cold Start Responding
- Power Supply Recognition Cutoff & Recording Time Setup
- Voice Recording Attached to the Driver Seat Camera
  (Option)

Software

- Log List Storage: 1 Year+
- Image Compression H.264
- Backup Recording (HDD and Flash Memory)

Peripheral Interface, etc

- Connection to Transportation and BIMS Available
- System Standard Protocols
- Recording of Dynamical Events
- Compatibility with Digital Tachograph Standards

Ⅱ-2. MOBILE DVR

3. Main Features

1) Clear & Sharp Image through Front HD Camera

- ✓ Million pixel HD camera
- ✓ Better vehicle plate number recognition comparing to other standards
- ✓ Self back-up memory function (optional)

2) Live-mode video surveillance (3G, 4G / Wi-Fi)

- ✓ Live Streaming & VOD function
- ✓ Video surveillance service through surveillance server
- ✓ Analysis of driver's driving habits

3) Automatic check-up of camera and recording status through wireless network

- ✓ Detection of the loss of the video caused by the damage of the device during an accident
- ✓ Daily (occasional) wireless transmission of the recorded video as a still image to the office
- ✓ Check-up of recording status of each camera of each vehicle (when interlocked with Xenovo Wi-Fi Digital Tachograph)

4) Interlocking with Digital Tachograph

19

Ⅱ-2. MOBILE DVR

4. DVR Specifications

XVR-1000

XVR-2000

Category		XVR-1000		XVR-2000 (Wi-Fi, 3G/4G)	
		5 CH	**8 CH**	**5 CH**	**8 CH**
Video Format		NTSC / PAL	NTSC / PAL	NTSC /PAL	NTSC /PAL
Video Input / Output		5 CH / 1 CH	8 CH / 1 CH	5 CH / 1 CH	8 CH / 1 CH
Compression		H.264	H.264	H.264	H.264
Display	**Resolution**	720 *480	720 *480	720 *480	720 *480
	Speed	Analog	Analog	Analog	Analog
		Real-Time	Real-Time	Real-Time	Real-Time
Recording	**Resolution**	1CH (HD),	1CH (HD), 3CH (D1),	1CH (HD),	1CH (HD), 3CH (VGA),
		4CH (D1)	4CH (CIF)	4CH (VGA)	4CH (QVGA)
	Speed	Total 120fps (D1)	Total 120fps (D1)	Total 60fps (HD)	Total 60fps (HD)
	Device	HDD (2.5" SATA)	HDD (2.5" SATA)	HDD (2.5" SATA)	HDD (2.5" SATA)
Backup Recording	**Device**	SD	SD	SD	SD
	File	Saved i-Frame Video	Saved i-Frame Video	Saved i-Frame Video	Saved i-Frame Video
Extended Interface		RS 232	RS 232	RS 232	RS 232
Sensor Input/Output		2 CH / 1 CH	2 CH / 1 CH	1 CH / 1 CH	1 CH / 1 CH
Voice Output		1 CH (phone jack)	1 CH (phone jack)	1 CH (phone jack)	1 CH (phone jack)
Storage / Operat. Temperature		-40 ℃ ~ 80℃	-40 ℃~ 80℃	-40 ℃~ 80 ℃	-40℃~ 80℃
		/ 0℃ ~ 60℃	/ 0℃ ~ 60℃	/ 0℃ ~ 60℃	/ 0℃ ~ 60℃
Operating Voltage		DC 12V ~ 24 V	DC 12V ~ 24 V	DC 12V ~ 24 V	DC 12V ~ 24V

Ⅱ-2. MOBILE DVR

Xenovo

XVR-2000 5 CH System Specifications

Category	Specification	Remarks
Compression	-. H.264	
Video Signal Input	-. NTSC VGA 4CH, 1CH HD(720P) SDI	
	-. NTSC VGA 8CH	Use of External MUX (Optional)
Audio Input	-. 1CH	
Video Signal Output	-. 1 CH Composite	
Network	-. Wired LAN, WiFi	
	-. 3G, LTE	
Recording Mode	-. Normal Recording	
Recording Quality	-. High, Medium, Low	
Storage	-. HDD, SSD Removable Type	
Backup	-. USB	
Data Embedding	-. GPS & MEMS Data	
User Interface	-. Keypad	
Time Setting	-. Set when interlocked with GPS/Tacho	
Dimension	-. 1 DIN Standard 177 X 165 X 50	
PC Viewer	-. PC Viewer (Windows 7, 8)	
Searching	-. Date, Event -. 1-32 Speed Playback & Reverse Playback	

Ⅱ-2. MOBILE DVR

Xenovo

XVR-2000 5 CH System Functions

Category	Specification	Remarks
1. Use of Mass storage Device	Mass storage HDD, SSD provide more than 7 day Full Time storage (when 8fps, Quality Medium is applied)	
2. Front HD Camera	High quality video is available through front HD camera	
3. Car Audio Standards Adopted	Easy mounting due to car audio device standards adopted	
4. Live Video Monitoring	Live video monitoring via wired or wireless communication	
5. VOD	Search, view & storage of video via wired or wireless communication	
6. Real-time Transmission of Driving Records	Transmission of vehicle speed, location, running state, etc. via communication network to a remote server	
7. Transmission of Event Video	Automatic transmission to the server & storage of generated live event video designated by the vehicle sensor or the driver	
8. Two-way Communication	Real-time two-way communication with a remote control server	

Real-time communication technology: 3G or LTE Modem required

Ⅱ-2. MOBILE DVR

eNOVO

5. Cameras

5.1 Camera specifications

Front

1.0 Mega 1/3" Exmor SONY CMOS

720p(1280X720)@30fps

HD-SDI(BNC)

Inside, Side, Rear

① **1/3" high quality SONY CCD**

② **Wide Angle Lens (92° ~ 136°)**

③ **IR LED**

④ **Dustproof coating**

5.2 Product Quality

H.264: Clear image quality

Standard 4 CH display

4 CH display with a map

Basic display

6. DVR Main S/W Functions

Recording

① Continuous recording, Motion detection recording, Dynamic event recording
② Dual recording (HDD error, simultaneous operation of storage memory when event occurs)
③ Scheduled recording
④ System Log storage

Display

① Simultaneous Performance: Monitoring, Recording, Playing, and Back-Up
② Vehicle Number Registration and Display
③ Event and Recording Display
④ Date and Camera Channel Display

Search

① Maximum Speed 32 (Forward, Reward)
② Play by Frame
③ Calendar, Time, Event, Log Search

Interfaces

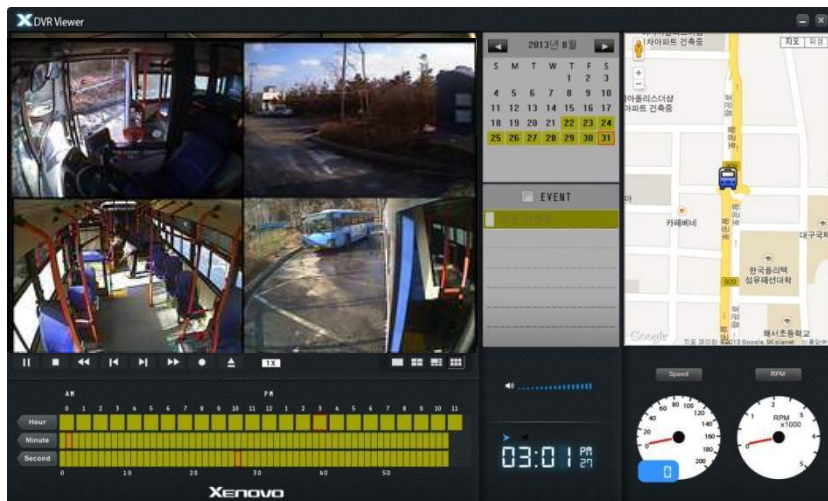① Digital Tachograph
② Bus Card Reader
③ BIMS
④ GPS

Update & recovery

① Update through USB and Network
② System Recovery through Xenovo Monitoring Software
③ Data Recovery through Linux ext3 Recovery Software

7. PC Viewer Program

XVR Viewer Program is a program which allows user to search for videos of any time period.

- ➢ Basic search of a desired time period
- ➢ Remote DVR , camera status check-up
- ➢ Password applied
- ➢ 1 ~ 8 CH search function
- ➢ Video back-up function
- ➢ HD video (1280 * 720) storage & playback
- ➢ Various search functions when interlocked with Tachograph
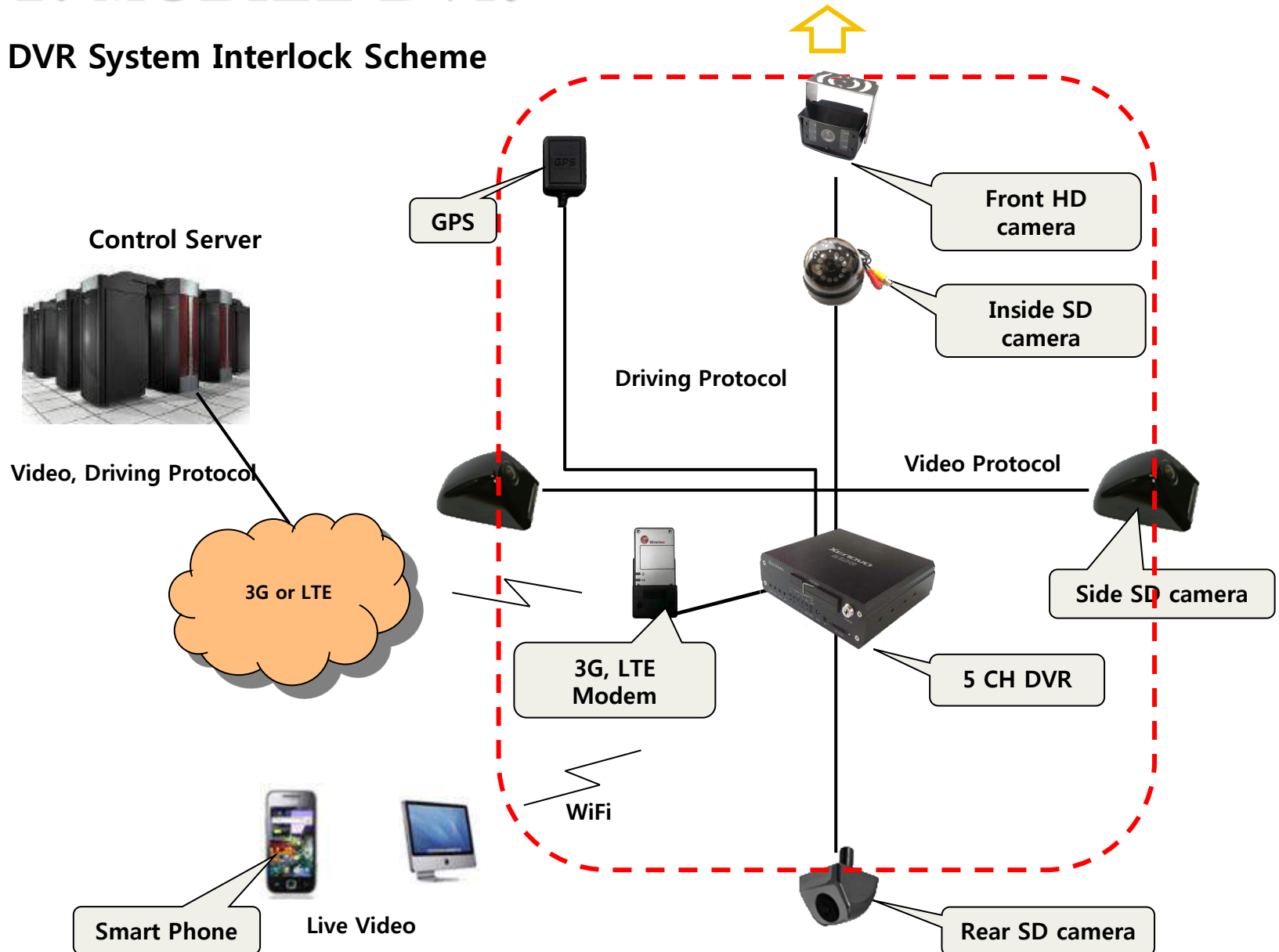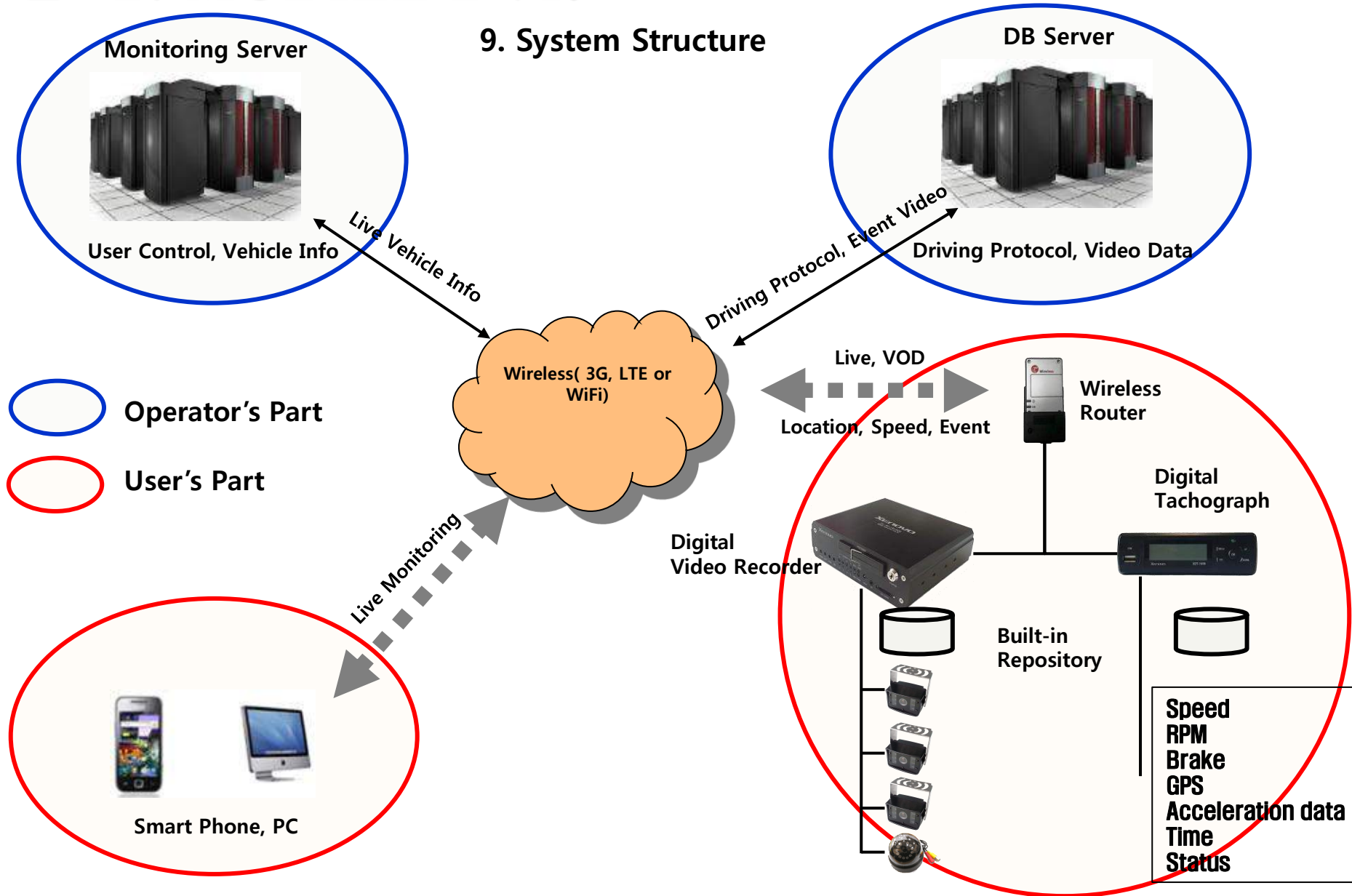- ➢ Displaying of Speed, RPM, brake & other driving data

XVR-2000

XVR-1000

Ⅱ-2. MOBILE DVR

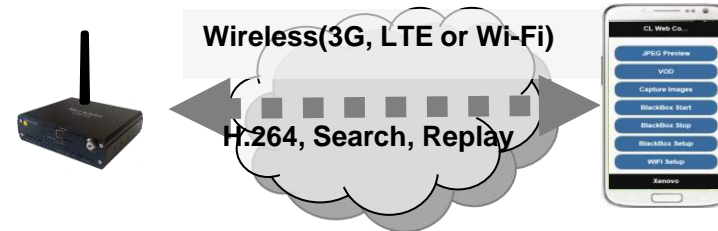## 8. DVR System Interlock Scheme

Xenovo

GPS

Front HD camera

Inside SD camera

Control Server

Driving Protocol

Video, Driving Protocol

Video Protocol

3G or LTE

Side SD camera

3G, LTE Modem

5 CH DVR

WiFi

Smart Phone

Live Video

Rear SD camera

Ⅱ-2. MOBILE DVR

Xenovo

9. System Structure

Monitoring Server

User Control, Vehicle Info

DB Server

Driving Protocol, Video Data

Live Vehicle Info

Driving Protocol, Event Video

Wireless(3G, LTE or WiFi)

Operator's Part

User's Part

Live, VOD

Location, Speed, Event

Wireless Router

Digital Tachograph

Digital Video Recorder

Live Monitoring

Built-in Repository

Smart Phone, PC

**Speed
RPM
Brake
GPS
Acceleration data
Time
Status**

Ⅱ-2. MOBILE DVR

10. Live Video Surveillance

Live View

Wireless(3G, LTE or Wi-Fi)

Live View

VOD

Wireless(3G, LTE or Wi-Fi)

H.264, Search, Replay

Surveillance Service

Control Server

Operation control

Event video

Video, location, speed

Wireless(3G, LTE or Wi-Fi)

Location, speed, video, event
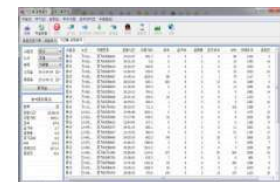
VOD Required

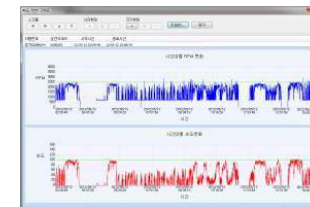**Location, speed, event video**

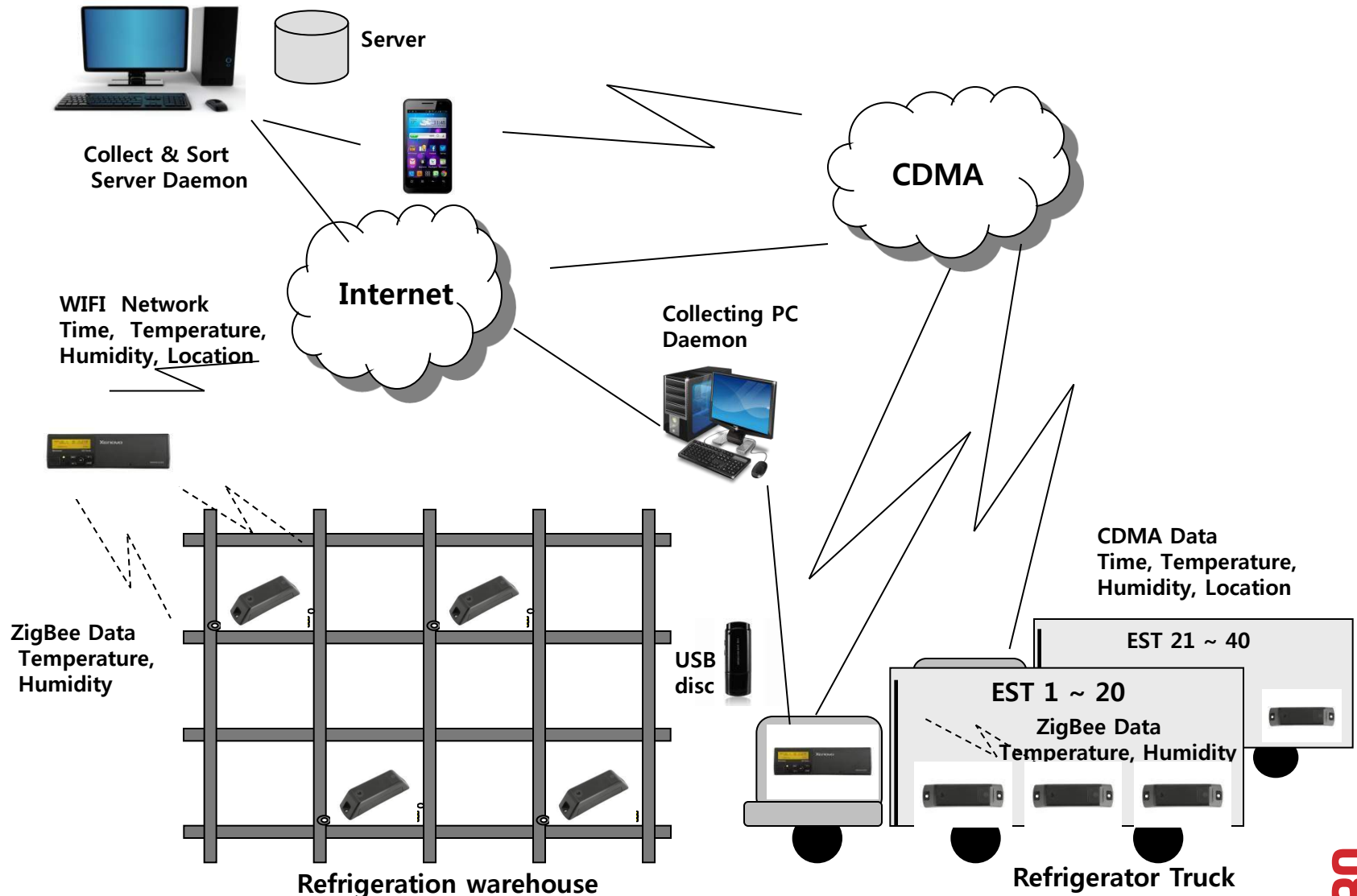### Operation Analysis

Location

Operation data

Operation graph

Ⅱ-3. Logistics Solutions

Ⅱ-3. LOGISTICS SOLUTIONS

1. **RFID/USN Based Temperature/Humidity Management System – Temp/Hum Sensor & Gateway**

Server

Collect & Sort
Server Daemon

CDMA

Internet

WIFI Network
Time, Temperature,
Humidity, Location

Collecting PC
Daemon

CDMA Data
Time, Temperature,
Humidity, Location

ZigBee Data
Temperature,
Humidity

USB
disc

EST 21 ~ 40

EST 1 ~ 20
ZigBee Data
Temperature, Humidity

Refrigeration warehouse

Refrigerator Truck

2. RFID/USN Based Temperature/Humidity Management System – Door Data (Open/Close)

Server

Collect & Sort
Truck Management Daemon

LAN

Internet

Smart Phone

Collection
Daemon

CDMA

AP

WIFI

CDMA

PEA

Door Data (Open/Close)

Bluetooth
Inquiry & Record
Door Data

Gateway

3. RFID/USN Based Temperature/Humidity Management System – Refrigerator Control

Main Server

Collect & Sort Daemon

Internet or CDMA

Smart Phone

Data (Bluetooth, Serial)

Door Open Data

Door Open Controller

ZigBee, Bluetooth

Driving Data

Bluetooth, Serial

OBD Ⅱ

Data

WiFi, ZigBee, Bluetooth, Serial

G/W (DTG) Controller

Network Control

Evaporator

ZigBee, Serial

Condenser

Temp/Hum Controller

Compressor

Ⅱ-3. LOGISTICS SOLUTIONS

4. Fuel Flow Meters

4.1 Engine Fuel Flow Meter

4.2 Fuel Level Sensor

Xenovo Co., Ltd.