► Wi-Fi Hot-spot in Metro Transportation
► Driver Fatigue Detecting System
► Public Transit Mobile Surveillance
► Mobile Surveillance
► Railway Control and Management
► Fleet Management
► Vehicle Telematics
Background

Due to the rising awareness of environmental friendliness, more and more people are taking metro transportations such as subway and mass rapid transit as their primary commuting option. As people are spending more time on trains, and, with the popularity of smart mobile devices, they would like to maximize their time efficiency during their traveling time. Therefore, managements of rolling stock organizations are taking onboard Wi-Fi service into consideration. Regarding signal reliability and rolling stock environment, the most convenient solution is to implement an onboard gateway with wireless network connectivity and processing capability rather than installing a local Wi-Fi network or a satellite-based system. The onboard gateway will act as the Wi-Fi hot spot, so that passengers will have the access while spending time in the trains.

The onboard gateway must integrate the following functionalities in order to fulfill the technological requirements.
- Network Connectivity
- High-performance Processor
- Convenient Maintenance
- Environmental Reliability

Lanner Solution

By taking the requirements above into consideration, Lanner’s LVR-5700 serves as the ideal onboard gateway to provide Wi-Fi access for in-train passengers. LVR-5700 is driven by Intel® Core™ i7-3517UE Processor to deliver extreme data processing capability and multimedia performance for onboard infotainment and network traffic management.

Regarding network connectivity, LVR-5700 provides 8 rugged M12 PoE LAN ports. The PoE ports meet IEEE 802.3af standard. With PoE Ethernet functionality, LVR-5700 is able to serve as the Wi-Fi hot-spot by connecting with wireless AP or routers. In addition, the internal of LVR-5700 is designed with a mini-PCIe socket with SIM card reader which can provide another source of wireless network (3G/4G-LTE).

With regards of environmental reliability, LVR-5700 is compliant with EN50155 EMI only standard and has passed MIL-STD-810G for shock and vibration resistance so that the gateway can operate stably in a traveling train.

From the discussion, LVR-5700 can be well-deployed as an onboard gateway in metro transportations. For other applications, LVR-5700 can also be ideally implemented in airports, rail stations, city transportations, shopping malls and stadiums in a similar approach.

Key Applications

- Onboard Video Surveillance
- Audio Intercom
- GPS Location-Based Service
- Digital Signage and Infotainment
- Emergency Alarm System
- Passenger Information System
- Driver Advisor System
- Wi-Fi Hot Spot
Scenario

Enabling Wi-Fi Access in Metro Transportation with Reliable Gateway System

Antenna Tower

Antenna Tower

Wireless AP

Wireless AP

Wireless AP

LVR-5700

LVR-5700

LVR-5700

LVR-5700

LVR-5700

LVR-6000

LVR-6000

LVR-6000

LVR-6000

Feature Products

Fanless Rolling Stock IP67 Control Box
- Intel® Core™ i7-3517UE 1.7 GHz
- Robust Vibration-proof IP67 / M12 I/O Ports
- Pass MIL-STD-810G Vibration & Shock Test
- EN50155 Compliance

LVR-5700

Fanless IP50 Surveillance Computer
- Intel® Core™ i7-6600U 2.6 GHz
- Support 10 x IEEE 802.11af PoE Ports
- Robust M12 I/O Ports
- EN50155 Compliance

LVR-6000
Driver fatigue is accounted as one of the most prevalent causes of traffic accidents, especially with heavy-duty vehicles such as mining trucks, excavators, bulldozers, cranes, cargo trucks and commercial buses. Drivers of these vehicle types can experience long-hour shifts and may fall into asleep at wheels temporarily in a "doze" mode when hit with fatigue or drowsiness. In fact, there are reports indicating that 1 out of 6 fatal accidents is caused by drowsiness or fatigue. Therefore, owners of heavy-duty service vehicles are searching for in-vehicle solutions that can detect the level of driver condition to lower down the accident rates and damage costs. In order to achieve this driver fatigue management, the vehicles shall implement a rugged in-vehicle PC with the following technological requirements:

- Processor with Reliable Performance
- GPS and Wireless Network Connectivity
- Connections with Alarms and Sensors
- Display Capability
- Camera Implementation
- G-sensor

Fig. Heavy Vehicle Driver Fatigue Management System
Lanner’s LVR-2010 is a fanless, power efficient in-vehicle gateway PC with EN50155-compliant design, power efficient Intel® Atom™ E3845 CPU, wide temperature support and rich I/O ports with rugged M12 connectors.

LVR-2010 features Intel® Atom™ E3845 CPU to deliver the required processing ability in SoC (System-on-Chip) 4-core architecture and low power TDP. The CPU platform also comes with Intel Integrated HD graphics to process multimedia data efficiently.

LVR-2010 has been EN50155 and MIL-STD-810G certified to offer multiple endurance standards against shock, vibration, humidity and extreme temperature (-40 ~ 70°C), in order to ensure its reliability during vehicle traveling. To protect the Box PC from potential dust and liquid splash, LVR-2010 is designed with IP-67 rated M12 connectors for three COM ports, two USB ports, two LAN ports, CAN Bus port, video/audio outputs and DC power input. In fact, the rich and protected I/O ports provide connectivity with peripherals such as alert devices, IP cameras, and infrared sensors.

GPS and G-sensor are also built in LVR-2010 for location tracking and acceleration measurement. Regarding display functions, LVR-2010 features VGA and HDMI output ports.

With the versatile design, LVR-2010 is definitely a reliable platform for driver fatigue management.

**Featured Products**

**LVR-2010**

**EN50155 Compliant & IP67-Rated Railway Embedded PC with Intel® Atom™ E3845 Processor**

- IP67-rated M12 connectors
- 2 x Mini-PCIe sockets with 2 x SIM card readers
- Wide range operating temperature from -40 to 70°C
- Onboard GPS receiver module and G-sensor
- 1 x mSATA, 1 x SATA 2.0 for 2.5” HDD storage
- Optional CAN bus port (J1939/J1708)
- Rich I/O: 3 x USB, 3 x COM, 1 x MIO, 1 x Audio, 1x VGA, 1 x HDMI
- Built in wall mount kit

- Digital Logistics
- Fleet Management
- Driver Advisor System
- Route Optimization
- Audio Intercom / GPS Tracking
- Emergency Alarm System
The increasing number of terrorist attacks to public transits has rapidly triggered the awareness of passenger safety. Public transportation like buses and trains in major cities became victimized for bombing. Mass transit operators are urging for a real-time mobile surveillance system to capture what could have been missed throughout the moving buses or subway system.

The implementation of real-time mobile surveillance and video analysis system on public transportation can capture high resolution videos and simultaneously stream to law enforcement for taking immediate responses and actions and effectively putting off attempts from terrorist attackers.

A system engineering company that specializes in digital audio recording, video analysis and broadcasting solutions partnered with Lanner to develop an integrated mobile video surveillance solution for public transit. While the company designed the central control software for intelligent transportation management, Lanner designs the mobile surveillance NVR for vehicle and rolling stock environments. The mobile surveillance NVR shall support the following technological requirements:

- EN 50155 Compliant Design
- MIL-STD-810G vibration & shock resistance per request
- Seamless integration with CCTV and IP Camera
- H.264 or H.265 HD video encoding
- Robust IP-rated M-12 connectors
- Built-in GPS/QZSS/GLONASS with ADR for navigation
- Externally accessible and removable storage
- Acts as Wi-Fi Hot-spot and provides Internet Access

**In-vehicle Mobile Surveillance System**

**Railway Mobile Surveillance System**
Lanner Solution

Lanner offers rich ODM/OEM customization options and has designed various mobile in-vehicle/in-train NVR solutions in China, Europe, North America and Asia. Our mobile surveillance NVR product lineups are certified with MIL-STD-810G against shock and vibration per request, as well as EN-50155 compliance for demanding rolling-stock environments.

Lanner’s intelligent hardware NVRs feature high-performance Intel x86 processors, capable of handling video intensive operations such as H.264/H.265 encoding, facial recognition, object counting. For robust and reliable connections with IP cameras, our mobile surveillance NVRs come with 8 to 10 PoE (Power over Ethernet) ports protected by vibration-resist M12 connectors.

To function as Wi-Fi hotspots or real-time video streaming, our mobile surveillance NVR systems are all built with multiple mini-PCIe sockets that support mobile network connectivity including Wi-Fi, 3G, and/or 4G/LTE bands.

Lanner offers strong I/O integration for its in-train/-in-vehicle platform. It boasts an abundance of I/O, storage, sensors and RT connectivity, including serial COM/USB/ ports, video outputs, swappable HDD drive bays, on-board GPS, making it all-in-one, one-for-all integrated communication platform perfect for other add-on applications such as infotainment, passenger information, route tracking/navigation and more.

Featured Product

For more information about in-vehicle NVR and ODM/OEM options, please visit:

http://www.lannerinc.com/vehicle-computers/vehicle-surveillance-nvr/

For more information about rolling stock NVR and ODM/OEM options, please visit:

http://www.lannerinc.com/vehicle-computers/rolling-stock-computers/

Key Applications

• Mobile Video Surveillance
• Video Analytics
• Audio Intercom
• Emergency Alarm System
• Digital Signage
• Infotainment
• Wi-Fi hot-spot

Ensuring Secured Public Transit Environments with Mobile Video Surveillance System
Background

A well-known solution provider in North America, one with 75 years experience in providing turnkey solutions for criminal investigation and forensic products, came to Lanner for an in-vehicle video recording solution intended for a fleet of evidence collecting vans. The hardware solution must be shock and vibration resistant in order to survive unfamiliar and unpredictable road conditions when coming across over the course of crime scene investigation and evidence collection. In addition, this in-vehicle computer must be able to connect up to 6 cameras at one time and provide quick data retrieval from computers to portable disks for submission, together with all collected evidence, at a speedy transmission.

Lanner Solution

Lanner’s LVC-5770 was eventually selected as the ideal solution for these evidence collecting vans. The LVC-5770 features a powerful Intel® Core i7 processor, 2 SSD drives and 8 LAN ports with PoE support, collectively enabling multi-channels real-time video recording and data storage. The built-in suspension kit and E13 certification are a testament to the extensive vibration and shock testing the LVC-5770 has undergone, demonstrating its reliability for continuous video recording on even the roughest terrains. The LVC-5770’s functionality is enhanced by the custom USB 3.0 support, allowing plug-n-play function for fast data retrieval from the SSD storage.

Key Applications

- Law Enforcement
- Mobile Communication Gateway to Headquarters
- Speed Detector & Recording
- Prisoner Transport Video Monitoring System
- Unmanned Surveillance Operation
- Cyber Crimes Investigation
Using the **LVC-5770** as In-vehicle Recorder for Evidence Collection Vans

**Power Ignition Control**
A user-friendly Power Ignition Control is programmed to start and shut down the vehicle computer when the engine is started or turned off respectively.

**Multiple PoE Ports**
The design of multiple PoE ports enables our systems to function as mobile NVRs when connected with IP surveillance cameras for real-time recording.

**Onboard GPS & G-sensor**
Offer an on-board GPS receiver for location tracking and a G-Sensor for driver alerts.

**Military Standard Vibration & Shock Test**
The LVC series is compliant with MIL-STD-810G and has passed vibration and shock tests. A suspension kit is also included in some models to assist in vibration resistance.

**Wireless Connectivity**
Support Wi-Fi, 3G, 4G/LTE modules and antenna for wireless network connectivity.

**Fanless Design**
Without the most frequently replaced part, the systems can be widely deployed in various environments.

**Wide Voltage Input Range**
Offer compatibility with mostly adopted voltages, including 9~36 VDC, +12 V and 24V, ensuring compatible operations and reducing overheads.

**Multiple PoE Ports**
The design of multiple PoE ports enables our systems to function as mobile NVRs when connected with IP surveillance cameras for real-time recording.

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**Featured Product**

**LVC-5770**

**Fanless x86 In-Vehicle Computer with Intel® Core™ i7-3517UE**
- Mobile NVR with 8x PoE Ports
- 2 x Swappable 2.5” Drive Bays
- Built-in Suspension Kit
- E13 Mark Certification
Background

Many governments and transportation companies in the world are seeking intelligent and secure rolling stock solutions to reduce traffic congestion, air pollution and commuting time between urban and rural areas. In fact, today’s passengers and operators demand more than just reliability and efficiency, but also comfort, infotainment and environmental friendliness. To meet the ever complicated demands, a more integrated system with high degree of modular flexibility and scalability is required to integrate train-and-ground communication, air conditioning, door sensing/warning, passenger information system, and also surveillance and infotainment. A major Europe-based rolling stock manufacturer and provider came to Lanner with the following system requirements:

- Exceptional Computing Capability
- Modular Flexibility and Scalability
- EN50155 Certified
- Convenient Maintenance
- Digitalized Serviceability

Lanner Solution

Lanner’s LVR-8300 is a highly-integrated 3U rail system packing high-processing CPU, sixteen M12 PoE ports, EN50155 certified endurance and multiple modular expansions to operate as the brain of intelligent rail systems.

LVR-8300 is built with a high-processing, 4th Generation Intel® Core™ i5 4422E CPU (codenamed Haswell). The CPU is able to handle high-volume data transmissions and information flow, and process multimedia contents efficiently. Built with Intel x86 open-standard, the system structure can be easily diagnosed and maintained.

LVR-8300 offers up to sixteen M12 PoE Ethernet ports for connections with networking devices like WiFi access points and/or IP surveillance equipments. With M12 connectors, LVR-8300’s Ethernet ports can function reliably in rail environments.

LVR-8300 has been EN50155 certified for protections against shock, vibration, temperature, humidity and surge. Regarding hardware component reliability, LVR-8300 is designed with open-standard architecture and hardware monitoring capability for convenient diagnose and maintenance.

LVR-8300 is a highly scalable system with multiple modular expansions providing I/O functions including serial COM ports, GPIO, DVR, SATA/mSATA storage space, and the mini-PCIe sockets with SIM card readers for WiFi/3G/4G connectivity. This high-scalability nature allows LVR-8300 to be adapted in various rolling stock environments, simply by applying function-specific modules.

Key Applications

- Onboard Video Surveillance
- Audio Intercom
- GPS Location-Based Service
- Digital Signage and Infotainment
- Emergency Alarm System
- Passenger Information System
- Driver Advisor System
- Wi-Fi Hot Spot
Scenario

Featured Products

**LVR-8300**

**Rackmount Rolling Stock Control Box**
- Intel® Core™ i5-4422E/Celeron 2002E Processor
- Support 16 x IEEE 802.11at PoE Ports
- Robust Vibration-proof IP67 / M12 I/O Ports
- Flexible I/O Module Design for Customization
- EN50155 Compliance

**LVR-5700**

**Fanless Rolling Stock IP67 Control Box**
- Intel® Core™ i7-3517UE 1.7 GHz
- Robust Vibration-proof IP67 / M12 I/O Ports
- Pass MIL-STD-810G Vibration & Shock Test
- EN50155 Compliance
Nowadays, service fleet managers have put a strong emphasis on vehicle-to-center networking and communications in order to improve their productivity, cost-effectiveness and customer satisfaction. They are mostly centered at driver safety, fuel-efficiency, usage-optimizations, and asset monitoring. In other words, fleet managers wish to establish more efficient communication and job-dispatch mechanisms between service fleets and operation centers. To optimize fleet-management serviceability, Lanner has identified several technical requirements:

- Asset Monitoring
- Networked Vehicles and Telematics
- Navigation
- Shock and Vibration
To strengthen communications between dispatched fleets and operation centers, Lanner’s LVC- product lineups are designed with multiple mini-PCIe sockets for Wi-Fi and Cellular (3G/4G/LTE) modules. In addition, Lanner’s LVC-2001 supports multiple SIM card function so that service fleets can automatically switch to different regional network service providers/carriers when traveling to another region/country. This will greatly save SIM roaming cost.

GPS is another necessary implementation in Lanner’s vehicle computing line. With this navigation feature, vehicles on missions can optimize their traveling time with route planning, since time waste and fuel are the largest expense for fleet services.

Physical reliability is also taken into considerations. As vehicles are frequently on the road, sometimes unflat surfaces, Lanner’s LVC-1000/2000/2001 are all MIL-STD-810G certified for shock and vibration. In addition, all these models have passed E13 certifications.

For driving record analysis, Lanner offers optional CAN Bus design to connect OBDII (On-Board Diagnostic 2) for vehicle diagnose and predictive maintenance. Aside from CAN Bus, Lanner’s LVC-1000/2000/2001 (model dependent) are designed with G-sensor, providing further recorded data for physical impact of a vehicle.

**Featured Products**

- **Compact Fanless Vehicle Gateway Controller with Intel Quark SoC X1001**
  - Intel® Quark™ X1001 400 MHz CPU
  - Support VGA/HDMI & 2 x RJ45 GbE Ports with PoE
  - High Speed CAN Bus Support
  - CE, FCC, E-Mark Certification, RoHS Compliant

- **Compact Fanless Vehicle Gateway Controller with Intel BayTrail**
  - Intel® Atom™ E3845 1.91GHz CPU
  - Support VGA/HDMI & 1 x RJ45 GbE Ports
  - Support Optional CAN Bus
  - CE, FCC, E-Mark Certification, RoHS Compliant
Today, many hospitals and health-care institutions are searching ways to improve survival rates for their emergency rooms. Most of the facilities used by current ambulances are below ideal. In fact, it has been reported that a considerable number of in-vehicle medical staff is still relying on radio systems to communicate with their hospital colleagues, which often fails to provide detailed communications so that hospital staff is frequently less-than-prepared when receiving the victim/patient.

Some medical institutions have begun using off-the-shelf computer systems to try to solve this problem but the benefit is limited due to their below-average performance and reliability in vehicle environments. Also the need for real-time unbroken communication with bus control centers over the city-wide 3G network.

Functions Needed for a Mobile Medical Solution

A rugged mobile platform with flexible and scalable Intel x86 microprocessors and multiple peripheral connectivity is the economical solution to conduct emergent medical missions such as telemedicine, video-communication, treatment preparations and clinical image transmissions. Critical functions include:

- Digitalized Measurement Results
- Mobile Surveillance
- Driver Behavior Data
- Peripheral Connectivity
- GPS Route Management

![Diagram of a mobile medical solution](image)
Lanner Solution

Lanner’s LVC-5000-B3 is a highly rugged and integrated vehicle computing platform built for mission critical applications. Built with Intel® Core™ i7 CPU, LVC-5000-B3 is capable of delivering high processing power and graphic presence required for video-communication and telemedicine so that detailed information can be conveyed with very low system latency.

To enable wireless network, LVC-5000-B3 offers both 3G and WiFi connectivity so that patient data can be linked to a MCA and enables the medical tablet to transfer data to hospital staff.

For in-vehicle monitoring purpose, LVC-5000-B3 is designed with 4 Ethernet LAN ports with PoE (Power-over-Ethernet) capability, ideal for installations with IP cameras to enable real-time surveillance.

Regarding connections with external devices to conduct medical operations, LVC-5000-B3 delivers 2 serial COM ports, GPIO, GPS sensor, and USB ports for purposes such as medical instruments and sensors, route and location tracking, and MCA connection. Regarding audio support, LVC-5000-B3 provides Mic In/Line Out ports for sound transmitting devices like microphone and speaker to conduct voice calls or recording tasks. In case of controversies, there is an ODB-II interface to retrieve data logs of driver behaviors.

Featured Product

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Key Applications

- Mobile Clinical Assistant
- GPS Route Management
- Mobile Surveillance
- Video Communication
- Patient Video Imaging
- Telemedicine