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Monitoring public transportation fleet with Zabbix-ready hardware

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Get Connected Anytime, Anywhere.

ORing
Industrial Networking
One-stop Solution Provider

ORing in Vertical Market

- Railway
- Marine
- Solar Energy
- IP Surveillance
- Oil & Gas
- Building Automation
- ORing-PaaS Cloud
- In-Vehicle
- ITS
- Wind Power
- Smart Grid
- Mining
- Manufacturing Automation
- IIoT

ORing Worldwide

1.Headquarters (Taiwan)

2.America

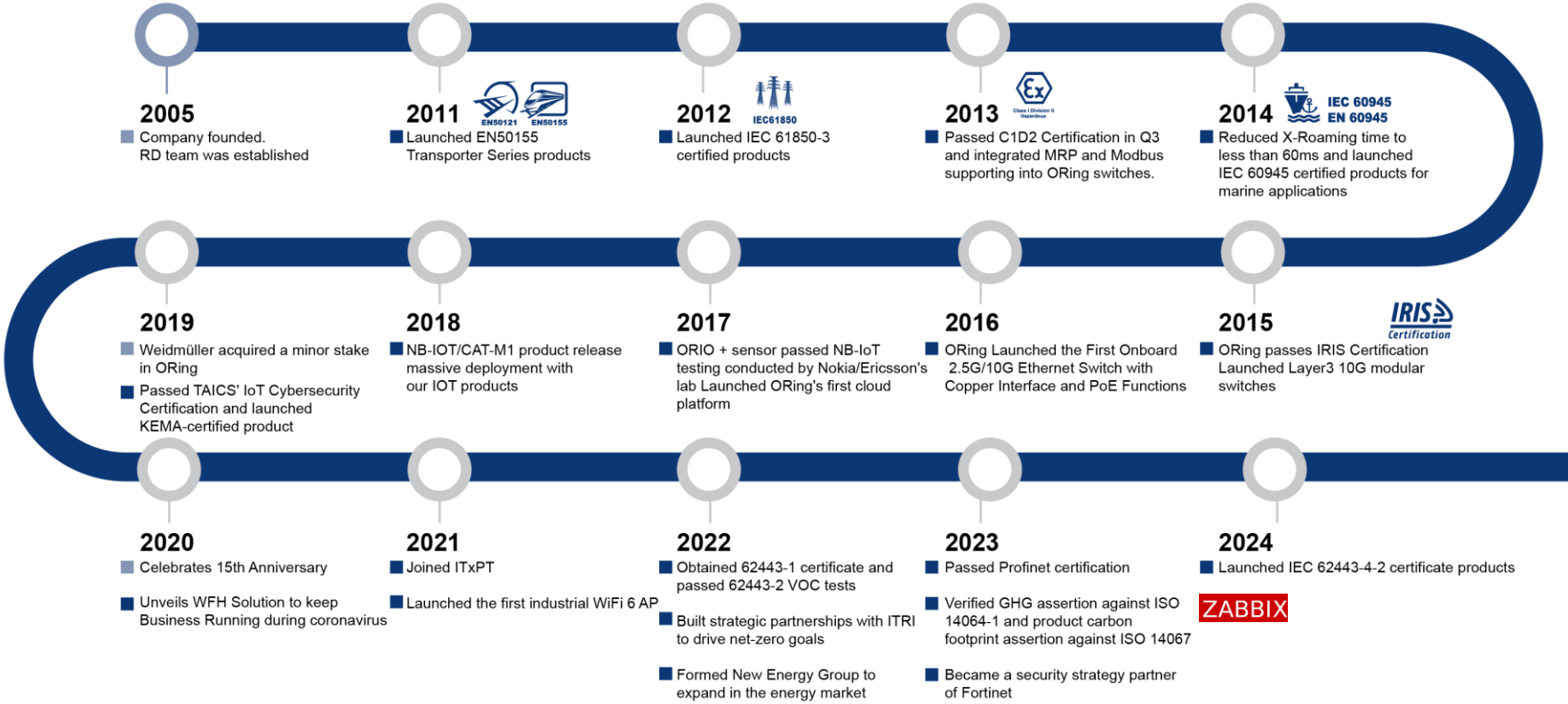
3.China

4.Europe

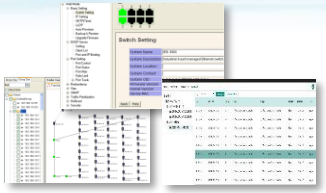
5.India

1	4	70	>200	50%
Headquarters	Branch offices	Dealer	Headcount	R&D Capabilities

ORing Milestones



Core



ZABBIX

Node-RED

Ignition

Magi Collect

IIOT ORing-PaaS-Cloud

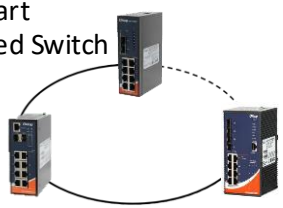
On-Premise Server

EMS ORinger

Magi Connect

Edge

Smart Unmanaged Switch



Unmanaged Switch

Lite Managed Switch
Managed Switch

EN50155 series

Wi-Fi AP/CPE

Cellular Router

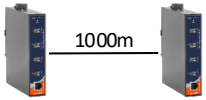
LPWAN Gateway

Field

Serial Device Server

Media Converter

PoE Accessories



SPE Switch

Remote I/O

Smart Network Adapter

Lighting Controller

Application

Industrial Hardware and Software Synergy

Project Background

Taking De Lijn's buses and trams to the next level

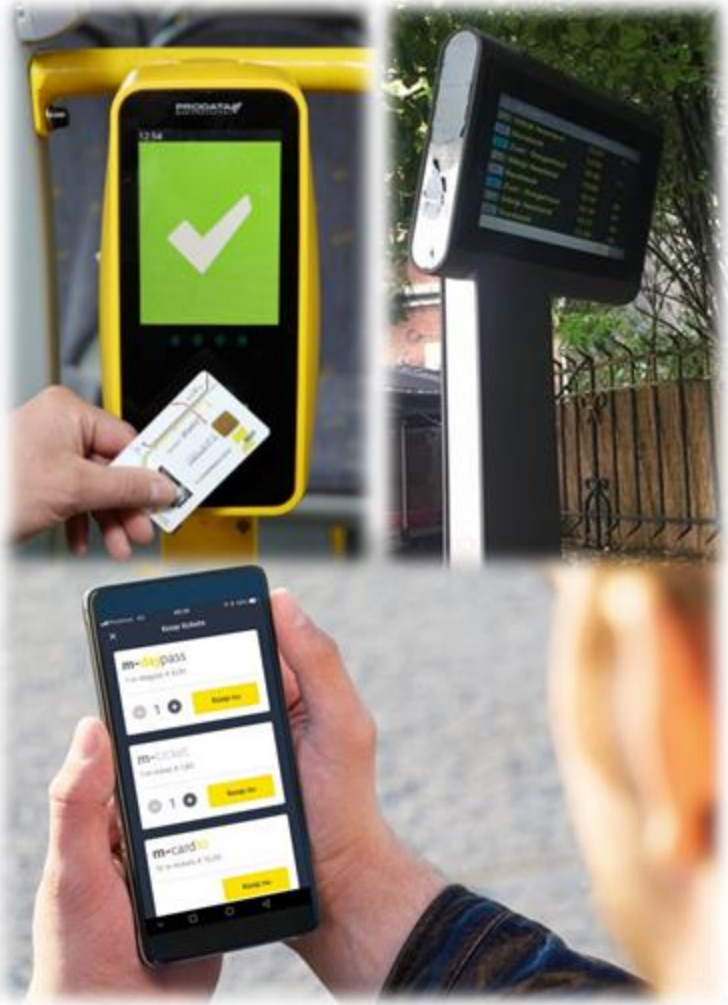
- public transport operator in Flanders, Belgium.
- 3.5 million passengers every year
- 10 million journeys every year
- 8000 employees
- 4500 public transport vehicles – buses and trams

Strengthen digital transformation,
improve fleet efficiency,
and increase customer satisfaction

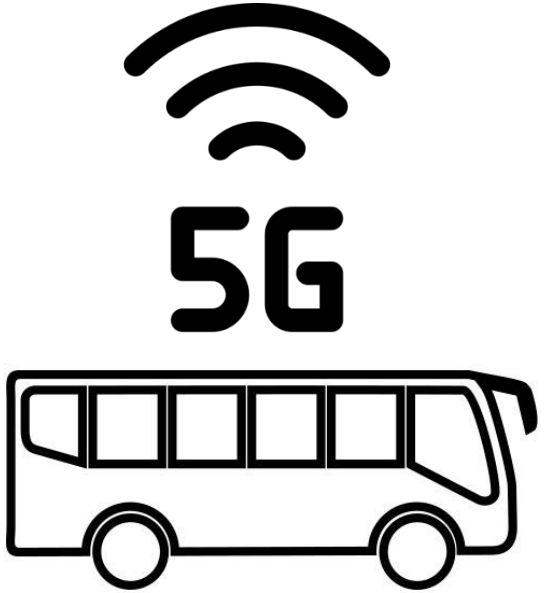
Project Background

IToB - IT on Board

- Better control over data
- Better punctuality
- Seamless Connectivity
- Traffic information
- Vehicle status information
- Improved onboard security
- Improved passengers' comfort



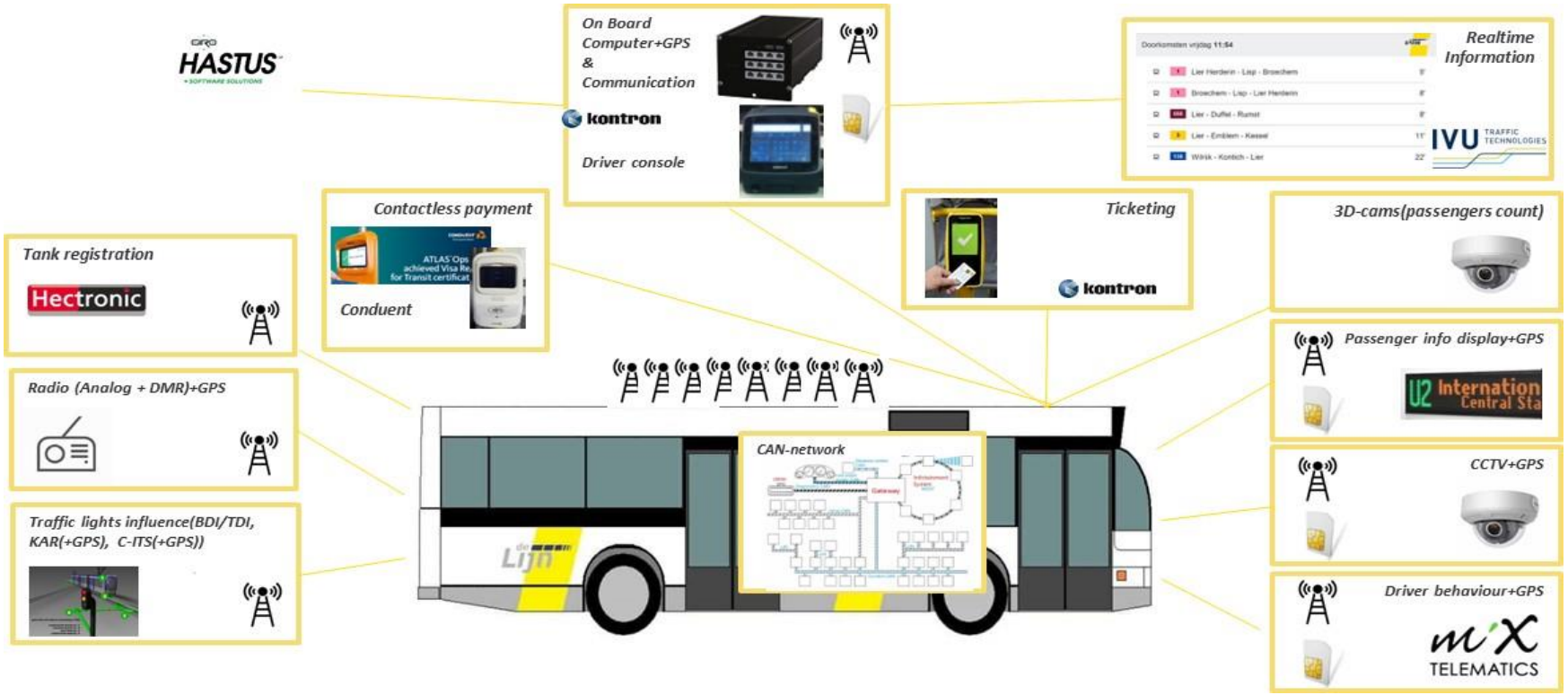
Project Background



3G sunset by end of 2024

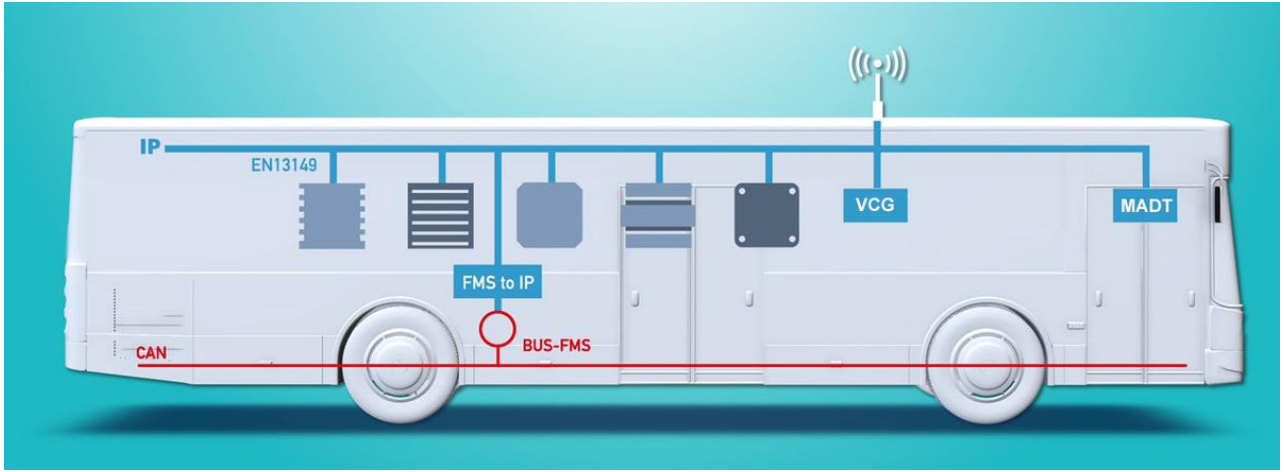
Future-proof communication

Project Background



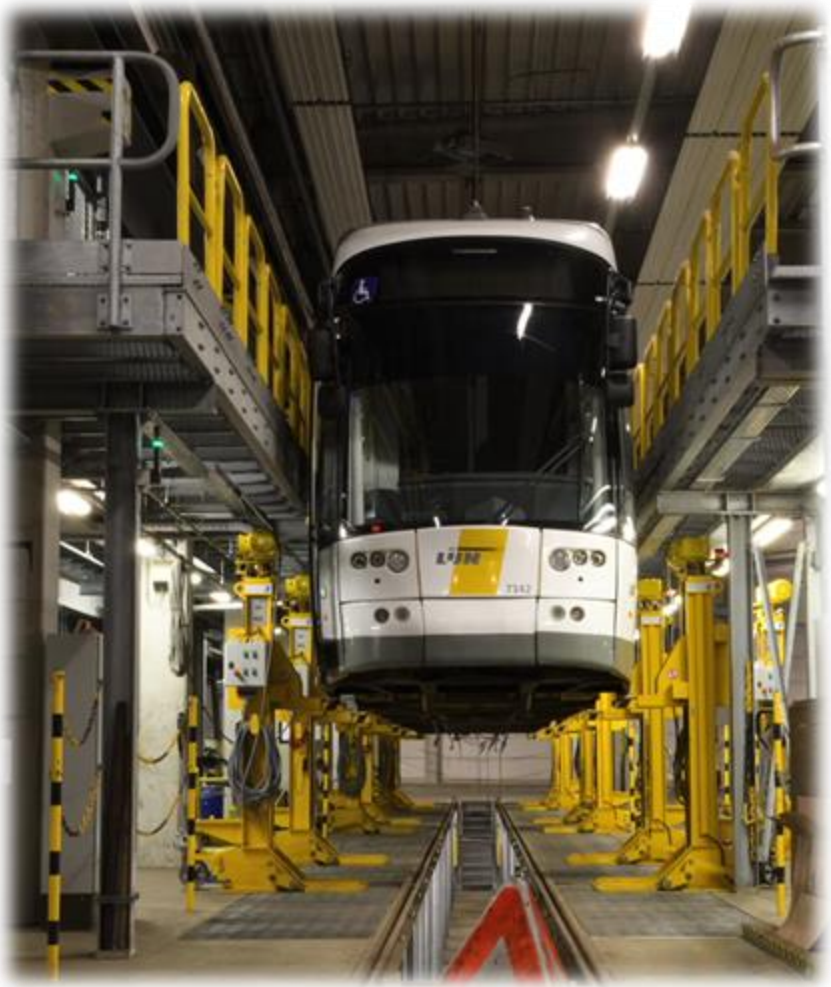
ITxPT x IToB

- Design a proactive architectural vision for IT smarts on the vehicles
- Go for a phased implementation
- Use ITxPT as a starting point of inspiration



Project Information

- **Timing and planning:** the installation started in January 2024 and must be finished by end of 2024
- **Project size:** 3920 buses, 438 trams
- **Solution requirements:**
  - 5G bus router with E-mark certification
  - 5G tram router with EN50155
  - ITxPT inventory service specification
  - Monitoring and management tool



Monitoring and Management System

- The “health” of the communication modules is hence of utmost importance
- View on the health of the whole fleet
- De Lijn must be able to manage the assets, software and incidents centrally
- Manage rolling out software updates, incidents and technical interventions efficiently
- Asset management - allows De Lijn to verify where each communication module is at any point in time

Project Requirements

- Overview of all communication modules, with their last known location, software/firmware version and status (online/offline and updated at least every 15 minutes)
- Overview of the current errors and incidents
- Configurable definition of an incident condition
- Control the access from the management system to the vehicles
- Several levels of authorization/access control must be possible: admin, Technical, ICT etc…
- SSL connections with De Lijn certificates
- SSH v2 minimum
- SNMP V1, V2 & V3 trap
- Management API over HTTPS
- All actions logged in an audit trail with username, description of the action and timestamp
- Management tools for software/firmware updates
- Software distribution function to the communication modules, by configurable communication module group or vehicle group.

ORing Routers for De Lijn IToB project

EMC ECE R10

IGAR-1004-D5G

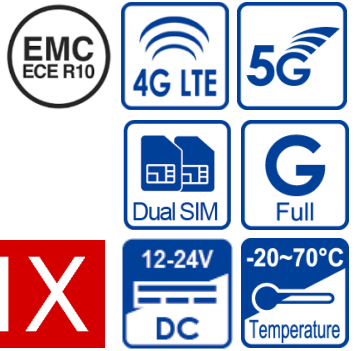
EN50155

TDGAR-1003-D5G-M12X

IGAR-1004-D5G

Industrial Vehicle 5G Cellular Router with 4x10/100/1000Base-T(X)

- Leading **ECE R10-compliant** router for vehicle application
- 4x10/100/1000Base-T(X) Ethernet with RJ45
- Supports 5G and LTE Modem dial up
- Dual SIM for backup
- Secured Management by HTTPs
- Various kind of WAN Connection Type supported: Dynamic/Static IP, PPPoE, Modem Dial Up, **Bridge mode**
- DHCP / Static IP address assignment
- Iptables configurable to prevent access from unauthorized IP address
- Booting time <90 sec.
- **Zabbix Agent onboard**



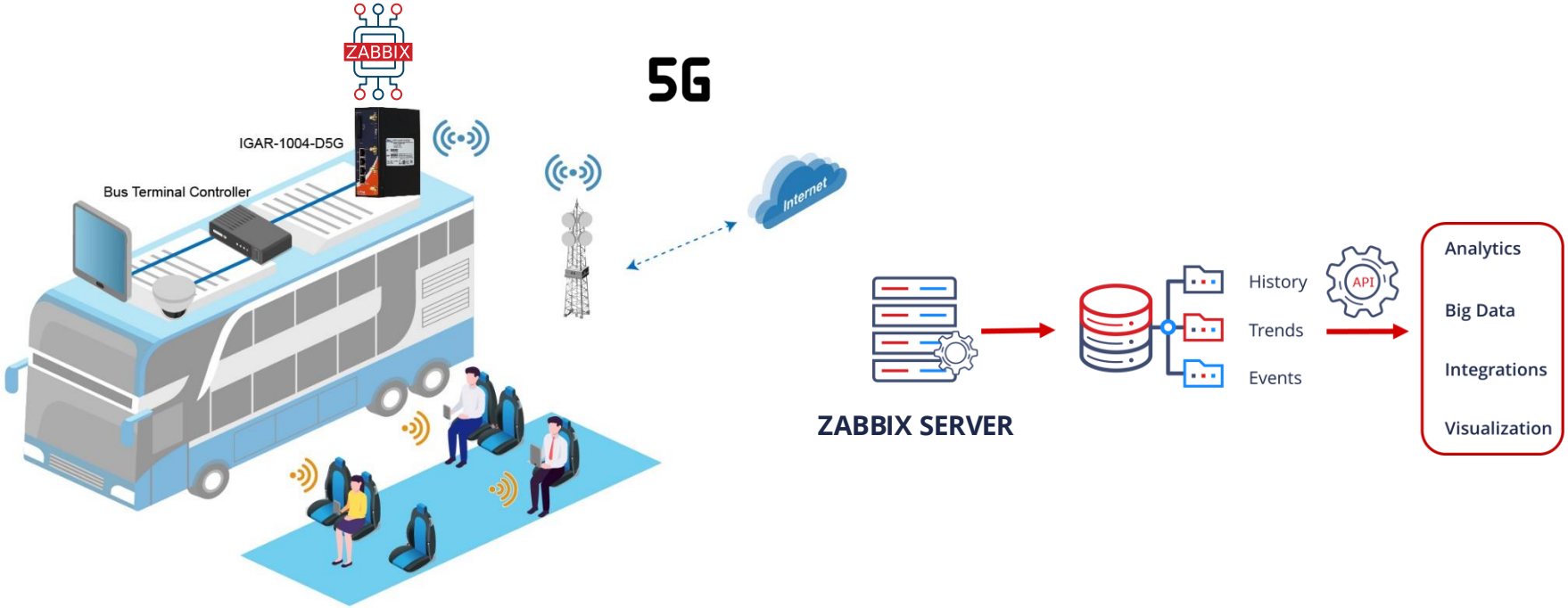
TDGAR-1003-D5G-M12X

Industrial EN50155 5G Cellular Router with 3x10/100/1000Base-T(X), M12 Connector

- Leading **EN50155** router for rolling stock application
- 3x10/100/1000Base-T(X) Ethernet with M12 X-coding
- Supports 5G and LTE Modem dial up
- Dual SIM for backup
- Secured Management by HTTPs
- Various kind of WAN Connection Type supported: Dynamic/Static IP, PPPoE, Modem Dial Up, **Bridge mode**
- DHCP / Static IP address assignment
- Iptables configurable to prevent access from unauthorized IP address
- Booting time <90 sec.
- **Zabbix Agent onboard**

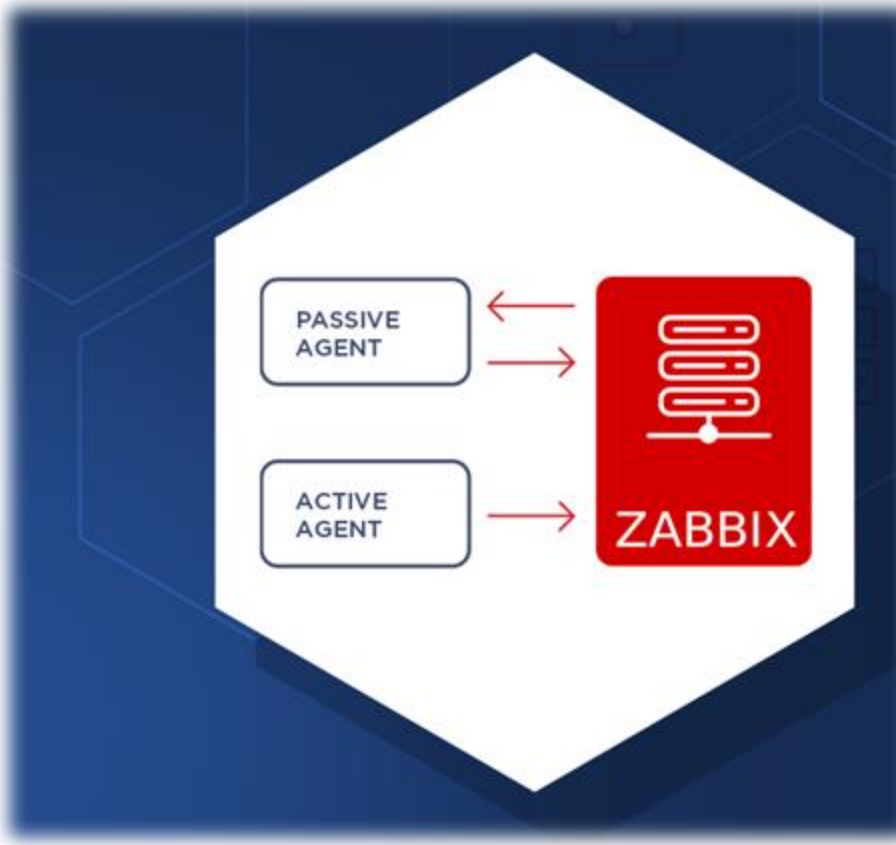
EN50155 | 4G LTE | 5G | Dual SIM | Full | ZABBIX | 12-24V DC | -25~70°C Temperature

Project Architecture



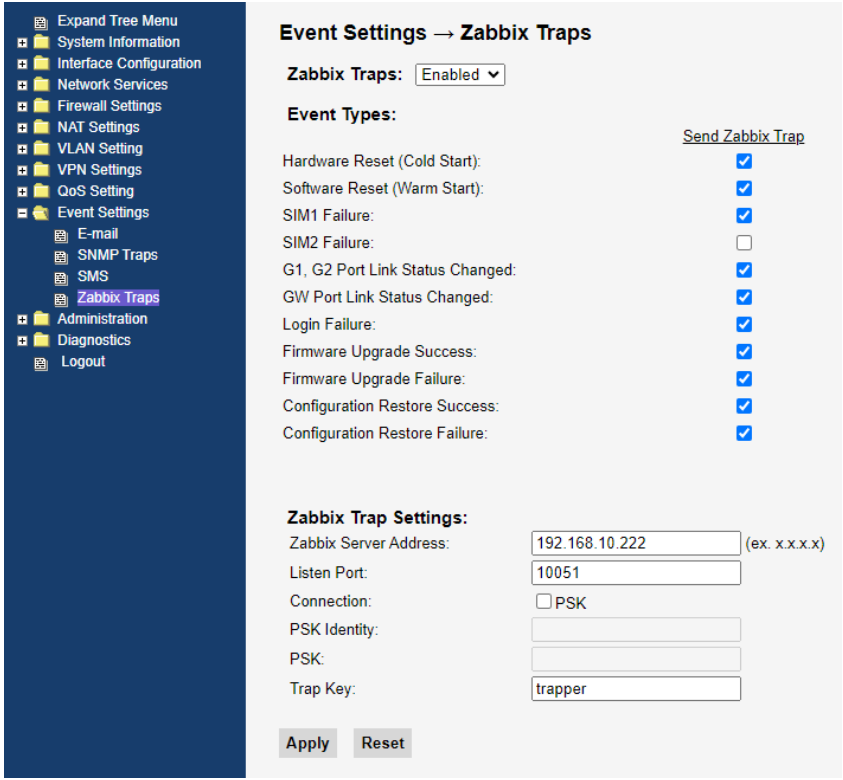
Why Zabbix?

- Open-Source, Flexible and Powerful Tool
- Configurable Active and Passive Mode
- Reliability and Good Technical Support Service
- Scalability
- User Management
- Auto Discovery with Device Templates
- Group Management
- Items Management
- Triggers and Problems Configuration
- Customizable Dashboard
- Alarms and Notifications
- Dynamic Traps
- Scripts for Software Distribution Function



Available Device Metrics

- Device online/offline status
- Device information – name, serial number, IP, IMEI, IMSI, firmware version, config file version
- GPS position
- Resources usage – CPU load, System load, memory space
- 5G modem and link status
- SIM card status
- Radio Type and Service Provider
- Signal parameters
- WAN interface traffic
- LAN interface traffic
- Dynamic event reports with Zabbix Traps



Dashboard

System Name	Firmware Version	Serial-No	LAN IP	IMEI
IGAR-DEMO	1.04	024037a03325	192.168.10.223	869814061124297

Modem status

valid (1)

SIM Status

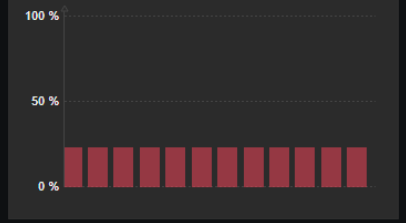
0.00

Modem Link Status

disconnected (0)

Memory Usage

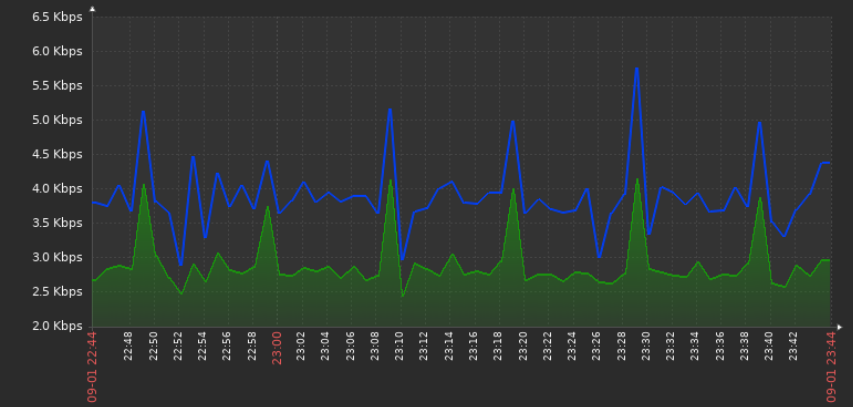
3.8 % ↑



CPU Usage

7.1 % ↑

IGAR-DEMO: Interface br-lan(): Network traffic



Dashboard

ORing Devices

IGAR	1
TDGAR	1

Problem hosts

Host group	Without problems	With problems	Total
IGAR		1	1
ORing Device		2	2
TDGAR		1	1

Problems

Time	Recovery time	Status	Info	Host	Problem • Severity	Duration	Update	Actions
2024-08-31 21:08:07		PROBLEM		IGAR-DEMO	/rom: Disk space is critically low (used > 90%)	1d 2h 38m	Update	
2024-08-31 21:06:02		PROBLEM		TDGAR-DEMO	/rom: Disk space is critically low (used > 90%)	1d 2h 40m	Update	

Thank You!