Bitcarrier is a system for real-time traffic and road monitoring. Vehicle movements are captured with a network of smart sensors, which are placed at strategic locations in city streets, on roads and on highways.

City and road operators wirelessly collect traffic information and can visualize and analyze results to better manage traffic flow. While drivers obtain instant updates about journey times and incidents, road operators receive all the data they need to develop agile mobility policies.

FEATURES
- Cloud-based or on-premise software suite
- Data analytics tools
- Real-time traffic maps
- Key traffic metrics:
  - Traffic intensity, vehicle speed, congestion level & travel times
  - Mobility profiling: origin and destination matrices
- Incident alert system: accidents, roadblocks, among others
- Historical and real-time traffic data statistics
- Third Party Data Input APIs
- Flexible integration with third party data feeds

BENEFITS
- Improve mobility strategy
- Manage and optimize traffic in real time
- Make faster decisions based on 24/7 information
- Easily add sensors to extend measurement range
- Save resources through fast implementation
- Decrease costs through easy maintenance
- Integrate with TMCs and information dissemination
- Manage congestion and reduce pollution
- Provide citizens and drivers with valuable updates
- Leverage system without privacy issues
- Improve your mobility strategy
Operational Intelligence for Cities and Transport Operators

BITCARRIER TECHNOLOGY

COMPLETE SOFTWARE SUITE

The wireless, intelligent Bitcarrier traffic flow management system is a combination of Worldsensing proprietary hardware and software. The Bitcarrier Software Suite enables cities and transport operators to collect real-time traffic information. The software suite includes two individual tools for analyzing and archiving data in real time: the Bitcarrier Configuration and Visualization Tool.

Bitcarrier can complement other existing traffic information systems enabling operators to use multiple sources of information and allows to integrate data quickly and easily.

ADVANCED SENSOR

Bitcarrier works in three steps: data collection, information processing and data visualization. It uses a 2.4GHz frequency band and scans Bluetooth and Wi-Fi signals emitted by mobile devices such as cell phones, GPS navigators, and hands-free kits. The system uses anonymous data from captured signals in order to provide information related to traffic flow in various environments, thus allowing to analyze and manage traffic more efficiently.

HOW IT WORKS

Worldsensing is not only among the leading providers for wireless data capturing, we also know how to extract intelligence from collected data to transform traffic management operations.
The Bitcarrier Configuration Tool helps users to easily configure their installation and allows setting up all Bitcarrier sensors, parameters and variables that are displayed in the Bitcarrier Visualization Tool.

**FEATURES**
- Set location of each device (longitude and latitude)
- Create links, metalinks, routes and travel times
- Use colored lines to create graphical links on the map
- Define thresholds of e.g. service levels, congestion, and speed publications
- Special configurations for speed, time and service levels
- Get alerts from different components

The Bitcarrier Visualization Tool is an online map showing results in real time. It can be accessed by multiple control center agents.

**FEATURES**
- Real-time maps and congestion levels
- Travel times and average speeds
- Dispersion traces
- Origin-Destination matrices
- Traffic prediction
- Number and type of tracked devices
- Monitoring of Bitcarrier sensors (e.g. availability, uptime, position)
- Historical data
- Allows exporting data in CSV, Excel or JSON

The Bitcarrier system uses proprietary algorithms to filter and process data sent by all sensors. People or vehicles circulating at lower speeds can be omitted.

**COMPONENTS**
- Node: data audited on one spot (one or more sensors)
- Vector (or Links): speed and travel times between 2 points
- MetaVector (or MetaLinks): combination of several vectors in a unique list
- Route: combination of vectors and metavectors

**PRIVACY**
- All Bluetooth and Wi-Fi identifiers audited by the sensors are anonymized using a hash algorithm, so that the physical address of a device is not traceable
- The communication between the client and the server is done using a proprietary protocol resulting in a very low GPRS data consumption
- In the server, all raw data (hashes) have a life time of 3 to 8 hours. The time depends on the environment and on the speed at which vectors between sensors are created
TRAVEL TIMES
Analyze travel times and average speeds to identify critical points just before congestions arise.

HEAT MAPS
Visualize traffic flows in real time to optimize routes or divert traffic to secondary routes.

SOFTWARE SUITE

TECHNICAL SPECIFICATIONS
Bitcarrier runs on a hybrid database that combines the advantages of relational databases and the flexibility and speed of NoSQL storage systems.

Bitcarrier runs on a cluster of 2 servers to ensure performance and resilience. Depending on the size of the deployment the servers can be increased to 6.

The Bitcarrier system offers secure web-based REST API services to connect to 3rd party software solutions and provides a connection to a raw database where all detections are aggregated and stored.

FEATURES
- JVM module (Java Virtual Machine) for data gathering
- JVM Software for origin destination matrix calculation
- JVM Software for data aggregation and for statistical analysis
- NOQL3 database based on CASSANDRA
- SQL database based on MYSQL
- Secure REST API in JSON format or standard XML formats
- The platform allows integrating and displaying geolocation data using external Keyhole Markup Language (KMLs)

HISTORICAL DATA

FEATURES

The tool allows to:
- Access historical data per day or time
- Predict real-time traffic based on the day of the week, hour or location
- Secure REST API

Bitcarrier can be integrated into Mobility, the City Operational Intelligence solution for city control centers.
The Bitcarrier sensor is designed for both urban and interurban environments. While Bitcarrier enables cities and transport operators to better manage traffic flow, drivers receive real-time updates to plan their journeys.

**KEY COMPONENTS**

- **BLUETOOTH AND WIFI SENSORS**
- **WIRELESS COMMUNICATION SYSTEM**
- **DATA MANAGEMENT AND ANALYTICS SOFTWARE**
- **ELECTRONIC VARIABLE MESSAGE SIGNS (VMS)**
- **STANDARDIZED API**
- **MOBILE APP**

**SYSTEM ARCHITECTURE**

Sensor network capturing Bluetooth and Wi-Fi signals emitted by mobile devices

- Network server hosts databases
- Online web client displays all results
- Secure web-based REST API to easily integrate results in 3rd party platforms or VMS

**DATA CAPTURING**

- Bitcarrier sensors capture up to 500 unique devices per minute which travel at speeds ranging from 5 km/h to 160 Km/h
- The number of lanes is 6 for each direction
- Simultaneous Bluetooth and Wi-Fi detection technology

**DEPLOYMENT AND MAINTENANCE**

- Sensors run on DC/AC/ PoE power and GSM 3G coverage
- No need to close roads to deploy sensors
- Plug-in ready to immediately start collecting data
- Can be easily integrated into existing infrastructures

**DATA PROTECTION**

- Anonymous data collection
- Doesn’t collect personal data
- Each captured signal corresponds to a unique identifier
- Anonymized identifiers prior to sending to server
- Deletion of original data after transmission
## MAIN SPECIFICATIONS

### PROCESSOR
Ultra low-power processor specifically designed for outdoor installations. Because of its ultra low TDP no fan is needed. This also minimizes the risk of failure due to moving parts.

### COMMUNICATION

#### Ethernet:
Passive POE (Power over Ethernet) sends both data and power to the device with the same cable. When Ethernet is available, power and connectivity are provided using the same cable. If a traffic light has an Ethernet socket, a POE connector can be installed to connect the device with the Ethernet cable.

#### Modem GSM:
Modem with 4 bands able to transmit GPRS, EDGE and HSDPA data.

### LOCATION
GPS receiver able to process GPS and WAAS satellite signals.

### STORAGE
- Non-volatile memory data storage
- Storage is activated only when the sensor is offline. When connectivity is recovered, all data in storage are submitted.

### DETECTION SCANNING

#### Bluetooth:
- BT 2.1 EDR (2.4 Ghz)
  - All versions are detected if Bluetooth is switched on (visible mode)
- Gain: 15.5 dBi (directional)
- Maximum range: 150m

#### Wi-Fi
- 2.4 Ghz
- Gain: 1 dBi
- Maximum range: 50 m

### POWER
- Two input options: VDC/ Passive PoE
- Power consumption: 4 W

### REMOTE MANAGEMENT
- Remote checking and maintenance of the nodes
- Remote detection of connectivity, coverage and system
- Remote updating

## MECHANICAL

### ANTENNA
Box with adjustable clamp for pole installation

### SIZE
276 x 272 x 96.5 mm (HxLxW)

### WEIGHT
2 kg

### CASING MATERIAL
ABS (UV RESISTANT)

### OPERATING TEMPERATURE
-35°C to +80°C

### STORAGE TEMPERATURE
-35°C to +80°C

### HUMIDITY
10 to 95%

### IP67
Compliant – Resistant to all weather conditions

### MTBF
10 years or 90000 hours

### STANDARDS COMPLIANCE
RoHs compliant

### REGIONS
CE, FCC, IC and NEMA compliant

## BENEFITS

### SOFTWARE SUITE
Monitor and manage traffic 24/7 in real-time with intuitive software. Instantly obtain information on speed and travel times.

### AFFORDABILITY
The cost of the Bitcarrier solution is significantly lower than other competing traffic information technologies.

### THIRD PARTY INTEGRATION
Complement other traffic information systems such as cameras to provide your traffic control center with multiple sources of information.

### WIRELESS SENSOR SYSTEM
Deploy wireless sensors quickly and easily and save money on cabling and costly installation. Once installed, they are easy to maintain.

### 24/7
Bitcarrier offers round-the-clock remote monitoring with real-time data and alerts.

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1. Depending on configuration.
HOW IT WORKS

DATA COLLECTION

Technologies:

Sources:

Sensors are placed on street furniture

Sensors detect Wi-Fi and Bluetooth devices

Data is transmitted every 7 seconds

PROCESS & MANAGE BIG DATA

Cloud

On-premise

OUTPUT / APPLICATIONS

→ Cities and Transport Operators obtain travel times, speeds, densities, incidents, O/D matrices and more.

→ Multidevice web, mobile, road panels

→ Make use of data mining tools to develop your own solutions and applications for citizens

TRAFFIC APP

Keep drivers up to date in real time by analyzing vehicle flows, congestion patterns, and travel times.

All Bitcarrier information can be integrated in a mobile App or published on a public website for citizens to check traffic information and plan trips accordingly.

→ Drivers receive real-time updates on available routes and traffic conditions

→ They can then avoid traffic jams

→ And save time by getting to destinations faster

Available for:

App Store

Google play

WORLD SENSING

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