



Netshield (Pty) Ltd.
Concept House, 10 Pony Street,
Tijger Valley Office Park, Silver lakes,
Pretoria.
Tel +27 (0) 86 111 4428
Fax +27 (0) 86692 9643
www.netshieldsa.com

NETSHIELD IoT Gateway CELL LOCK

DESCRIPTION

Business owners can now transport high-risk, high-value goods safely and securely with optional constant health/environmental monitoring of goods during transportation. When a vehicle is fitted with a Netshield Cell Lock intelligent GNSS/GPS locating and GSM communication device that will only allow the unlocking of a bolt locking system, locking the cargo container (safe) when the vehicle arrives within the pre-allocated geo-fenced area, within the allocated time schedule and the predefined unlocking control procedure is followed. The logistics supervisor has the ability to constantly view the vehicles progress, position and view the actual environmental conditions; temperature, humidity water flooding conditions within the cargo container.

Logged trip location, temperature, flooding and humidity readings are sampled every minute and sent via GSM communications to a multi or single tenant cloud based database during the trip and at each delivery destination as proof of environmental compliance of the goods during the transportation process. The immediate issuing of a summarizing compliance report to the recipient can be initiated during or after the relaying of a randomly generated encrypted access code from the cloud based monitoring software or the vehicle to the driver for use within the preassigned geo-fenced and time frame of a specific delivery destination.

The vehicle is pre-programmed to follow logistics manager's daily planned multi-stop delivery schedules/routes, this schedule can be edited on the fly by a supervisor as and when needed. The environmental conditions of each delivery destination, including the conditions during the period when the cargo doors are opened, are accumulatively logged and processed as part of the sequential delivery environmental report for each delivery.

Fitting this device to delivery vehicles radically reduces the probability of internally orchestrated losses, thefts and increases the time required to forcefully enter the vehicle during hijackings, thus increasing the time for armed response teams to reach the vehicle and adding the value of accurately recording all environmental and critical conditions during transit and delivery processes.

Systems Functionality

To ensure that the unit is secure and hidden away from unwanted attention the units are mounted, as out of sight as possible, within the cargo container. The unit connects both the GSM and GNSS/GPS to an externally mounted combination antenna, the battery of the vehicle, the ignition switch and immobilizer, the door monitoring switches, the bolt locking system door mounted systems and the required sensor set. The bolt locking system overrides the manufacturer's locking mechanism irrespective of the position of the manufacturer's locking mechanism, ensuring the integrity of the cargo container.

Ensuring the maximum possible security, the system will only respond only to pre-registered GSM and workstation devices, using the GSM based caller ID functions and IP security functions embedded within the Cell Lock Controller. In principle the controller will only allow the unlocking sequence of the door when the vehicle reaches the pre-assigned delivery Geo Fenced area and the unlocking sequence is initiated. The unlocking sequence can include a combination of predefined user unlocking conditions;

- Reaching the GPS perimeter (Geo-fenced) of the pre-set destination.
- When a random multi digit access code SMS OR GSM message is received by the controller;
 - Sent from the automated cloud based application server,
 - Sent from the driver's preregistered GSM Device after receipt from cloud based application server or control room,
 - Daily allocated access code sent via SMS OR GSM message from the driver's GSM based device,
 - When an access code sequence is entered incorrectly a remote alert will be generated.
- When an RFID access card is presented to the on-board RFID reader and the current location is the Geo Fence select for the "Home" warehouse.
- Emergency/distress code, incorrect sequence of the access code is received by SMS OR GSM message from the driver's preregistered GSM device and when within the delivery Geo-fenced area, this will also generate a remote hijacking alert.
- Using the coded cell lock security override key.

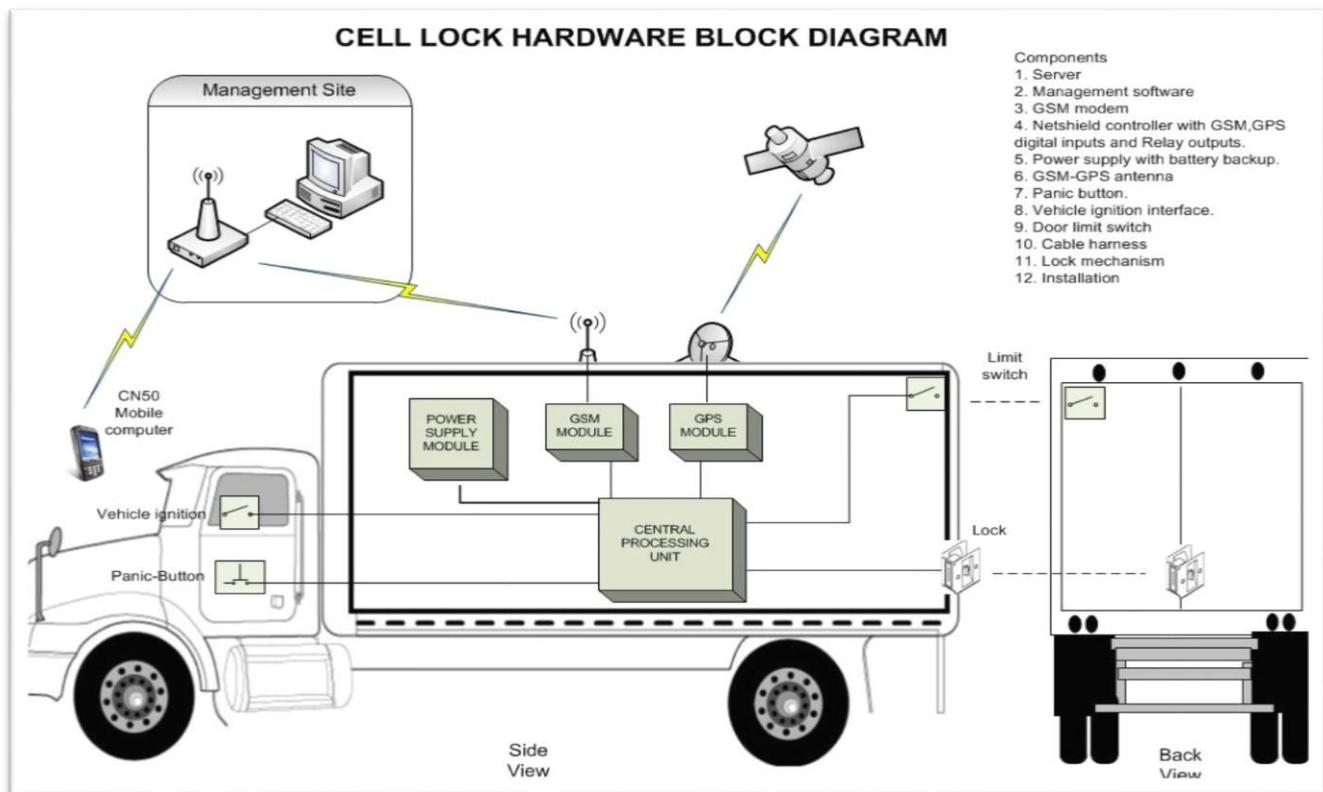
The cargo container access doors are fitted with precision door sensors, located within a protective enclosure, indicating the door statuses of the container door and triggers the automatic activation of the bolt locking system and transgression alerts of the door open cycle, including; predefined access

time and forced entry.

The system is powered directly from the vehicles starter battery but includes internal backup batteries.

Optional product enhancement;

- User definable interval based sampling and recording of temperature and humidity within the container (default – every 60 seconds with max at 30 minutes). The recorded samples are downloaded during each delivery stop to the server. The applicable recording reports are mailed to the client as proof of the environmental compliance during the transportation and delivery period. These reports are in an accumulative format resulting that the second, third delivery through to the last, receiving an accumulative report, including all environmental data from the initial departure. The system is configurable to send emergency temperature alerts too both the driver and dispatch manager if the temperatures reaches a predefined mayor temperature levels and a second alert if the temperature reaches a critical level.
- The device records the accumulated trip mileage (in kilometres) for each daily trip, records the distance travelled between stops, the time stamp of each stop and downloads the trip information to the cloud based centralized SQL database.
- The system includes a control device that can immobilize the vehicle during afterhours, this timeframe must be predefined.



Power Supply and Battery Options

- The internal power supply will operate from 12V to 30VDC input voltage covering both light commercial vehicles and trucks.
- Optional backup battery, lead acid (approximately 4 hours backup) or lithium Ion (approximately 24 hour Backup).

Alerts and Messaging

- SMS OR GSM based alerts always include the current GPS coordinates, time and date stamp and is sent to the control room and the automated cloud based application server when:
 - Battery voltage falls below a pre-settable critical depth of discharge % level.
 - The vehicle tow.
 - Ignition is switched on while the container doors is open.
 - Container door is open for longer than the predefined time.
 - Incorrect unlocking code is entered into the system.
 - Unlock code is entered in incorrect sequence.
 - Supervisor access card (RFID Tag) is used at the home depot to open container doors.
- Alerts/notifications that can be disabled:
 - Temperature high/low alerts.
 - Battery disconnected.
 - Door open time exceeded.
 - Ignition on while door is open.
 - Bolt lock activated while door is open.
 - Vehicle left waypoint while ignition is off.
 - Vehicle has moved while waypoint is off.
 - Temperature log.
 - Coordinates log.
- The bolt locking system fitted to the container door will automatically unlock when power/battery supply voltage reaches a critical low level and then the controller will shut down.
- The unit will automatically revert to an active power state when the power supply voltage is restored to normal powered condition.
- When a battery backup system is used with the controller, the unit will be able to operate normally within 5 minutes from the power up, giving sufficient time for the GNSS/GPS to acquire satellites and obtain a fixed position.
- The power feed to the unit is protected against reverse polarity.

Controller Unit Functional building Blocks

- Monitors all system inputs, GSM, GNSS/GPS, door switches, ignition switch status, Wiegand RFID keypad, sensors and battery status.
- Responds with a message/alert to control room using GSM device.
- Acquires coordinates from GNSS/GPS and relays to control at predefined intervals and locations.
- Acts on certain parameters to monitor and control power supply.
- Activates and deactivates the bolt locking system of the cargo container according to selected predefined unlocking/locking sequence.
- Sensors samples and conditions in the container during the delivery is recorded and downloaded.

Controller Unit configuration

- Preregistered driver number.
- Lock/unlock sequence configuration.
- SMS OR GSM Message Alert conditions.
- Disable all but most critical for operation or enable all.
- Main Power supply voltage failure (12- 30 VDC).
- Supply battery voltage low level, the system will send an alert and unlock door.
- Command room controlled destination coordinate changes.
- Command room systems reset.
- Temperature sampling interval 1 to 30 Minutes.
- Immobilizer afterhours time configuration.
- Immobilizer afterhours enable/disable.
- Vehicle ID number.
- Door open timeout alert period.
- RFID tag number.
- Minimum temperature alert trigger value.
- Maximum temperature alert trigger value.
- Geo-fence size.

Controller Unit Alert Conditions:

- Unauthorised opening of the cargo doors is detected by the container door sensors,
- Any request/attempt to unlock the bolt lock outside the pre-set GPS perimeter (Geo-fenced),
- System running from battery backup,
- When shutdown will occur due to backup battery low voltage,
- When vehicle is moving when;

- The ignition is switched off or,
- The bolt lock is not activated or,
- Vehicle ignition is switched on while door is open.
- Ignition is switched off and the vehicle is not in close proximity of the GPS perimeter (geo-fenced),
- When cargo door is kept open longer than a pre-set specified time,
- Panic button from the driver,
- When the access code is entered in reverse,
- Critical Temperature alert,
- Afterhours attempted vehicle start ignition status.

System functionality

- The dispatching supervisor can remotely open the container door of any vehicle parked within the Geo-fenced area of the distribution warehouse and by using the issued RFID card/tag.
- When the container loading process is completed and the vehicle is dispatched for delivery, the Cell Lock unit receives the information set include all delivery parameter from the cloud based server. This information will only be valid for a specified dispatch route, vehicle and driver.
 - An advanced option is integrated that the access code is only sent to vehicles once they are within the destination Geo Fence.
 - An option can enabled to retrieve the dispatch coordinates from the client financial system used for invoicing and delivery documentation, thus pre-planning the driver's delivery route according to the various delivery points that the driver needs to visit on his delivery schedule.
 - All messages are time and date stamped, recorded into the associated database.
- The destination coordinates messages include a sizing variable that determines the Geo fencing size.
- When a vehicle enters the Geo-fenced area, the controller sends the current location coordinates to the application server and automatically disable the container door alerts and automatically activates the door open duration alert monitoring sequence.
- The received access code entered on the driver's GSM Device by the driver and sent to the controller via an SMS OR GSM Device function.
- The application can be preconfigured that the controller must validate the code to unlock the container.
- If the entry sequence of the code is incorrect a remote alert is generated and an unlock command will be sent to the controller for driver safety.
- This code or codes will have to be re-entered each time access is required after the door was closed, an open/close activity counter can limit the number of times the door can be opened matching the number of delivery destinations per GPS perimeter (geo-fenced area) for multiple

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deliveries at the same GPS perimeter (e.g. a shopping centre with multiple deliveries).

- When the vehicle leaves the Geo-fenced area after a delivery was completed, the controller will send the current location GPS coordinates to the server and activate the door and ignition monitoring functions.
- An alert is sent from the controller to the management application if an unlock command is received or attempted outside the predefined Geo-fenced area.
- An alert will be sent by controller if the ignition is switched off outside the authorized Geo-fenced area.

Management Application System Functions

To decrease the risk information leakages and dependency on staff, the final objective is to enable the full automation of the application to function without any or very little user.

- Manage data of vehicles, drivers, controllers, allocations, codes and configurations.
- Generate random access codes.
- Manage GSM numbers.
- Log all events into the cloud management Database for analysis.
- Request vehicle location and display on map.
- Command to unlock door from management application, password protected.
- Receive and display all alerts as specified.

