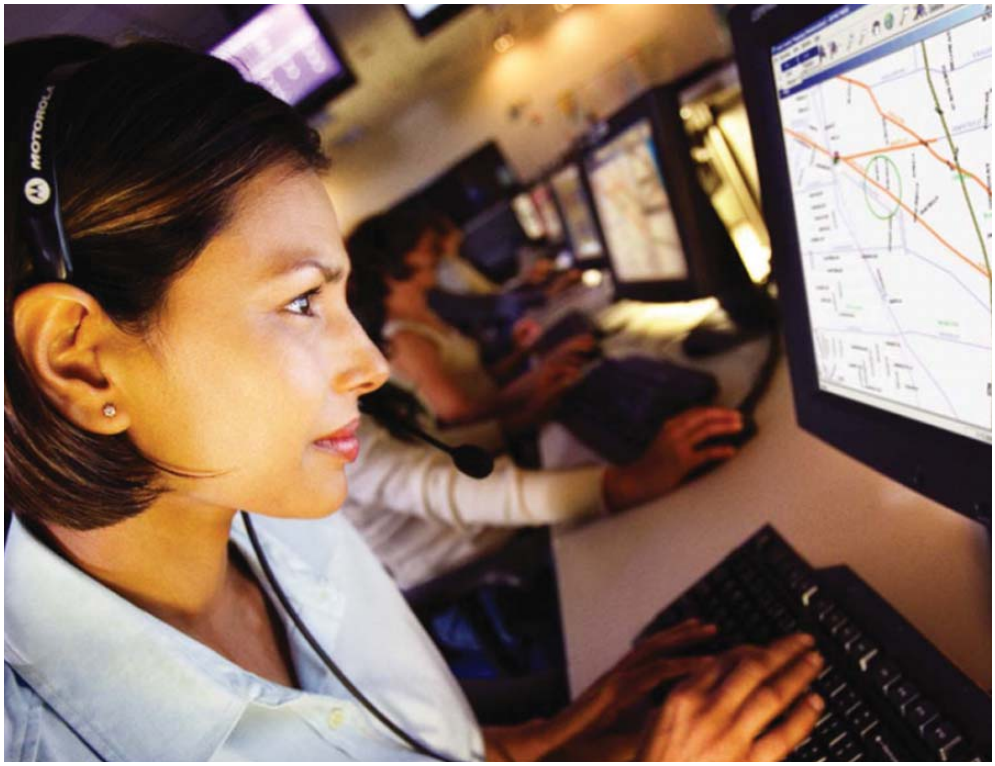
TRANSIT TRACKING
Location Tracking Solutions



Enhance personnel safety and fleet security
Improve resource allocation and responsiveness

Motorola's Transit Tracking portfolio provides the total solution for organisations wishing to track and manage vehicles and their cargo. Built around Motorola's established Location and Mapping products, it tracks the precise location and status of containers and their contents and displays this valuable data to control staff at remote locations, in real time.

The solution generates alarms to control staff if predefined rules are violated, such as unauthorized stops, deviations from planned routes, unauthorised tampering with equipment or cargo. This event driven approach enables control of vehicles and their loads to be managed by exception.

Applications

Trailer Tracking
Track the precise location and status of trailers to improve utilisation and improve reporting to customers.

Detect unauthorized stops and driving patterns, including deviations from planned routes. Avoid detention billing disputes with customers.

Container Tracking
Track containers while at sea, rail hauled, in yards or on the road with mapping and full auditing using a single integrated solution.

Attach self-powered mobile devices to containers without container modification.

Enter and verify details of shipment wirelessly using handheld devices for tracking container contents, source and recipient. Attach photographs of consignment to allow checking at destination.

Automatically be notified when defined events occur, including vehicles entering or leaving designated areas. Detect when vehicle deviates from planned route, doors are opened, trailers are unhitched and receive emails, text messages or pager messages automatically.

Typical Deployment

Customs need to track goods vehicles that are travelling through a given territory. This is achieved by attaching quick-mount GPS devices to vehicles as they start their journey at a customs entry post and using a PDA or PC to record details of the load they are carrying, agreed route to be taken, driver details, etc. The GPS devices transmit data over the publicly available GPRS network to the Control Centre.

At the Control Centre and Customs Posts, vehicle locations are displayed to control staff along with alarms generated as a result of any violations.

When a vehicle reaches a customs exit point, an officer confirms the identity of the vehicle and driver, checks the load is as expected and resolves any violations with the driver. To support this, at each customs exit post there is a PC that accesses the system via web pages. A wireless LAN provides connectivity for officers with PDAs so that they can more easily access the system.

Mobile customs officers can also access the system via GPRS from their PDAs – this allows for impromptu spot-checks to be carried out.

The typical workflow is as follows:

Starting a trip

On entry to the region, customs officers use the mobile client on a PDA to record details of the driver, vehicle and load, as well as associating a route and a GPS tracking device to the vehicle. The PDA is equipped with a barcode reader to make the entry of details more efficient. For example, a driver's license number can be scanned directly from the license.

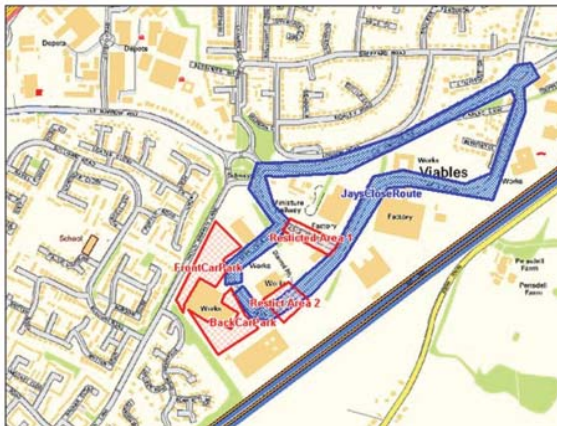
The mobile client leads the custom's officer through the process of gathering information and synchronises the data with the central database.

At any point the client workstations can also be used to access the Transit Tracking web pages to see the trip details being collected.

Once all of the details are gathered, the officer attaches a GPS tracking device onto the vehicle and scans its barcode to inform the system that this vehicle is being tracked by that particular GPS tracking device.

Optionally the officer can attach a re-usable electronic seal to the vehicle doors at this point. This option provides the ability to electronically seal doors on the vehicle and to monitor the state of these seals throughout the journey. The GPS tracking device monitors the state of one or more e-seals attached to the vehicle and reports if an e-seal is tampered with; has been opened; or has lost contact (as in the case of a trailer being detached from a tractor).

The operator can create or assign predefined geofenced areas to the trip, that can be used either as routes that a vehicle must stay within, or as restricted zones that vehicles must not enter. The system monitors where devices are and generates alarms when a vehicle strays off its designated route, or enters a restricted zone.



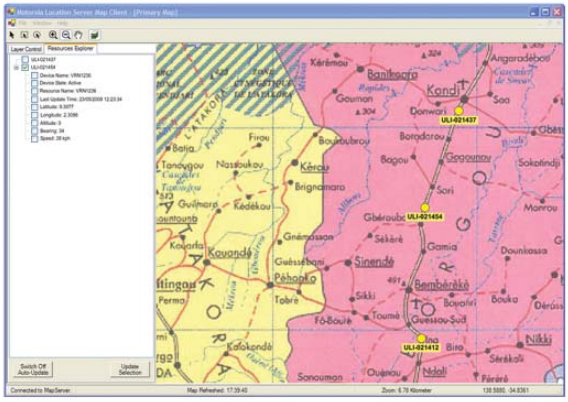
Entering the Region

At this point the vehicle is ready to be released into the region – the customs officer prints out a bar-coded trip report and hands it to the driver before allowing the vehicle to leave.

The GPS tracking device automatically starts reporting its location at a pre-configured refresh rate and the vehicles location is displayed on the mapping system.

En-route inside the Region

Once enroute, the location of vehicles can be viewed on a map on the client workstations either within the control centre or at any of the customs posts.

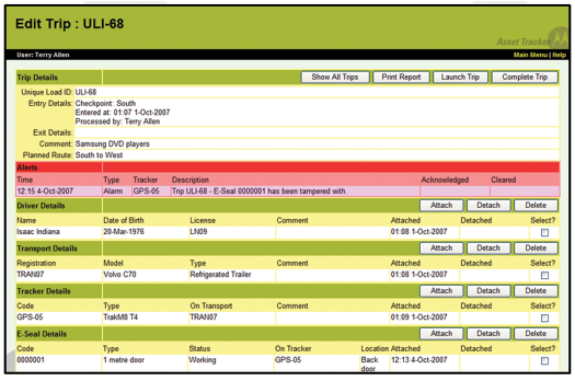


If the vehicle enters an area of poor GPRS coverage and location updates cannot be sent, tthe GPS tracking device stores updates and when connectivity is restored transmits a batch of updates.

If the vehicle violates any predefined rules, an alarm is raised to notify the customs team. Alarms include:

- Vehicle straying from its allotted route
- Speeding violations
- Unauthorised entry into restricted zones
- Unauthorised stopping for more than a predefined time
- Tampering with the GPS device
- Tampering with the door seal
- Missing location updates

At any point a mobile customs officer using a PDA can access the system to check on the trip details of any vehicle. Details of the vehicle and its planned route, along with any violations, can easily be retrieved by entry of the bar code, either manually or using the scanner in the PDA.

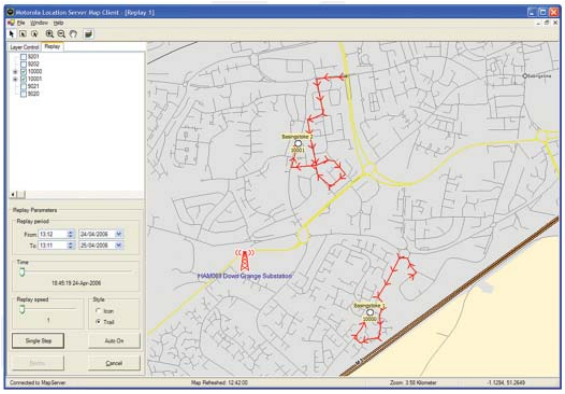


Completing a trip

On exit, at one of the customs posts, the customs officer scans the barcode of the driver's route report using his PDA. The system retrieves details of the driver, vehicle and load so that the custom's officer can verify that there are no problems with the trip. Any route violations or other events that have occurred during the trip are made accessible to the customs officer so that he can take appropriate action.

When the checks have been completed the customs officer removes the GPS tracking device and door seal from the vehicle and signifies that the vehicle is leaving the region. The tracking device and seal can then be reused on another vehicle.

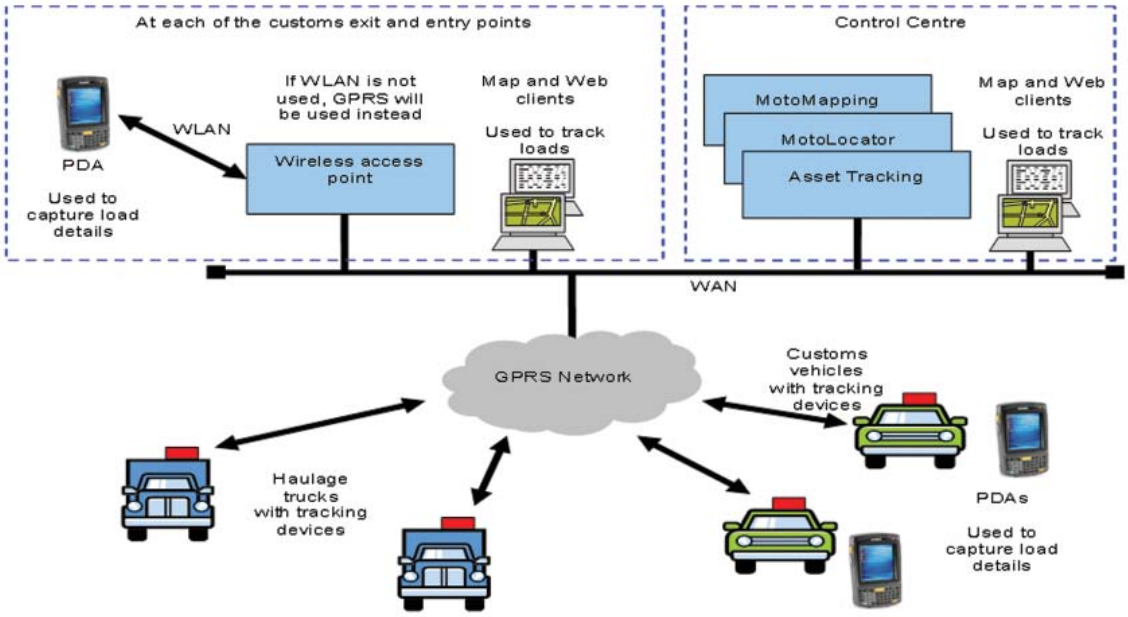
At this point the vehicle will then no longer appear on the mapping system although the history of its location updates and details are retained by the system for future use. A simple to use replay facility is provided by MotoMapping – allowing the historic locations of any devices to be retrieved from the database and replayed on the mapping system. This can be very useful in resolving disputes where a driver denies straying off route for example.



Reporting

The system provides a number of default reports and in addition customised reports can be developed using a report generator. Typical reports may include:

- **Transit Permit** - When a vehicle starts its trip a transit permit is printed and given to the driver.
- **Exit Permit** - When the vehicle arrives at an exit point an exit permit is printed showing details of all violations.
- **Vehicles currently enroute** - A list of all vehicles currently within the country is shown below
- **Completed trips** - A list of all completed trips within a certain time period.



Architecture

Location reports received via the GSM network together with shipment details entered using PDAs aor networked PCs are stored and processed centrally at the control centre.

The central servers run Motorola's asset tracking, location and mapping solutions, allowing PCs or PDAs with access to the customer network to be used to enter and display data.

Optionally the system can be deployed with re-dundant servers to run in 24/7 high availability mode.

The system uses standard Windows login security. The mobile client software running on the PDAs requires the user to login to access the system.

Ease of configuration

The solution has been designed to offer maximum configurability from a customer perspective. Colours, layout, language are all driven from configuration files to allow for maximum flexibility.

The system will run using different language packs – so the customer's local language can be used.

Tracking Device

The tracking device is a discrete device with integral GPS aerial and GSM/GPRS modem. It can be powered from the vehicle supply or integral battery.

The device includes interfaces for local sensors within the vehicle, including temperature sensors, door seals and panic buttons. Events occurring based upon these sensors can be configured over the air to cause messages to be automatically sent to SMS phones or pagers. The device can be mounted permanently or supplied with magnetic clamp or suction mounts to allow for re-use and easy attachment to vehicles.

Door Sensor / Cargo Seal

Re-usable, electronic seals can also be supplied. This option provides the ability to electronically seal doors on the vehicle. The tracking device monitors the state of one or more e-seals attached to the vehicle. It is able to detect if an e-seal has been tampered with, or has been opened, or has lost contact (as in the case of a trailer being detached from a tractor).

PDA

Motorola can supply a rugged PDA for field workers to use to log and check shipments. A custom application on the device takes the user through a series of screens into which details of the shipment are entered. This will permit the creation of a barcode which can be attached to a container for the duration of its trip.

Through use of an integrated barcode reader, the same device can be used at destinations and other locations to cross reference a bar-coded shipment with centrally held records created when the shipment was made.

Understanding your needs

In today's world, you need a solutions provider that understands what Mission Critical is all about: the lives and well-being of your employees and the business processes they are delivering.

That's why Motorola is a leading provider of interoperable communications systems. Our experience, along with our skills, people and partnerships, allow us to build innovative, fully integrated technologies that let organizations like yours share vital information with ease and confidence.

We've been doing it for many years and we'll be standing by our customers for years to come.

For more details…

Visit the Motorola website a
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