Satellite Communications and Fleet Management – An Integrated Approach to the Road Transport Industry

Bob Cleary

(*Alcatel Euteltracs*)

Communications with vehicles has come a long way since 1979, when drivers made 'check calls' from roadside telephone boxes. With the advent of mobile phones, fleet managers were able to contact their drivers, whenever they wanted – well almost. But talking requires two people to be available at the same time. Usually the driver does not concentrate, because he is driving, and has to call back – more charges, and when did you last record a phone conversation? Now, satellite communication allows transmission of vehicle position and data. Messages sent to vehicles are stored in the vehicle (and by the sender). Messages sent to the office are stored at the office. Neither messages or positions can be intercepted. The purpose of this paper is to illustrate why the 'key to better fleet management' is in integrating data from messages with other systems. Pre-formed messages requiring only the 'blanks' to be filled bring standardisation to the system. Message fields can be formatted so that specific data may be collected and posted to other software packages. Users of such systems report savings in manpower by reducing duplication of work e.g.: a message confirming the delivery of a consignment, sent by the driver, is posted to the accounts system and an invoice raised automatically. The future includes transmission of bar codes, signatures on PODs (proof of delivery notes) and viewing of consignment positions, by customers, on the Internet. The conclusion must be that – in the battle for survival, where making profit can sometimes depend on saving costs – it will be those companies that embrace technology to link all their systems so as to exchange data, who will win out.

KEY WORDS

1. Communications. 2. Fleet management. 3. Vehicle tracking.

1. INTRODUCTION. Twenty years ago, commercial drivers were required to stop en-route to make *Check Calls* to state their position and to receive further instructions. Of course, there was no method of confirming their location and so they could make up anything. A shrewd dispatcher could request the number of the telephone so that he 'could call the driver back'. But of course, if the driver did not want to be traced he would say, 'the number had been erased from the phone'.

When the mobile phones (Global System for Mobiles – GSM) arrived, they were a godsend to the dispatcher. Now they could call their driver whenever they wanted, and the driver could telephone the office whenever he wanted. Of course, the driver

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could also telephone home and when home telephoned the mobile, the cost would be charged to the mobile. Telephone bills went sky high. It was not a bed of roses. Dispatchers were forever on the telephone. Drivers would switch off – if they did not want to be disturbed! A driver could still tell the office that he was wherever he wanted them to think. Coverage was a major problem. Dead spots were well known both by drivers and the criminal element! This year, the problem is likely to be saturation of the SMS or Short Message Service. After all, SMS was only ever intended as a channel for engineering testing. The phone relies on two people being available at the same time. Problems arise when more than one driver wants to call the office at the same time, or when you are on the telephone to your drivers and your customers are trying to call you.

Satellite services first brought GPS – Global Positioning System – developed by the US Military. GPS equipment gives a vehicle a very accurate position. This facility was then linked with GSM to relay the position of the vehicle back to its base. This cut out the need for driver interpretation of his position and at last gave the office a true location. Or was it? It is possible to intercept the signal from the GPS system and, with difficulty, relay a false position. Communication satellites also provided the facility to transport data. This meant that the dispatcher could now type his message – taking time over the spelling of foreign words etc. or even cutting information from say a word processor and pasting it into a message. The message could be sent to the vehicle without disturbing the driver. A single data message can be sent to all vehicles in the fleet at the same time! e.g. *French dockers on strike at Calais – re-route via Zeebrugge*. Drivers can read messages when they stop and can reply to them when they are able. All messages are tagged with a date/time stamp. Messages from vehicles are also tagged with the position at the time of sending.

2. DATA VERSUS VOICE. Telephone calls can be recorded! But how many companies record telephone calls? With some telephone systems, calls can be shared – e.g. 2 or 3-way conference style even between different offices – but can you be sure to get everyone available when a driver calls? How can telephone calls or voice messages be integrated with computer software? It might happen on *Star Trek* that a driver could use his mobile phone to say 'I have delivered the consignment to the customer. Please raise invoice', and the computer, with voice recognition, automatically prints an invoice. In real life, this is not (yet) possible. Data, on the other hand, can be passed freely around a network. It can be stored and retrieved at will, by any user, whether it be on the same PC, a different PC or a different office, even a different country – all via a network or e-mail. Data messages can be sent from base to vehicle, vehicle to base, vehicle to vehicle, base to customer, vehicle to customer or customer to vehicle.

3. INTEGRATION. The dictionary describes integration as 'combining into a whole' or 'amalgamating or uniting'. Data integration can therefore be described as:

> Automatically combining data from a variety of sources and utilising this amalgamation of information to improve company performances.

Questions that spring to mind might be 'What data should be integrated? or How do I choose the data I need?'

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The main elements for integration are:

- Vehicle location – e.g. Consignment tracking,
- Messages from office/from driver – e.g. Loading instructions,
- Driver/vehicle information – e.g. Engine speed v road speed.

First on the list of the elements for integration is vehicle location which is usually presented in longitude and latitude – and is time stamped. Unless familiar with longitude and latitude, the data will mean little. Fortunately, the software database interprets this information and translates it as miles (or kilometres) to the nearest town.

For example – Lat 52°27·8′N Long 13°27·9′E = 4.595 Miles SSE Berlin, 1·460 Miles NE Britz.

Second on the list of elements for integration is messages. These are sent by the dispatcher, via a HUB and satellite, to the vehicle. The driver also sends messages via the satellite to the HUB. The HUB acts rather like a mailbox. Copies of the message may be sent to auxiliary screens, e.g. another office of the transport company, the shipper or even the consignee. Connection from the HUB to the dispatcher can be either through a leased line or through a dial-up modem. Messages received by the dispatcher are filed and presented with a status attached. For example:

- Whether the message has been read or not,
- If read, a note to say who else has seen the message,
- What priority was given to the message by the driver,
- Details of the author – driver or vehicle I/D,
- Date and time message was sent and received,
- Message text.

Messages may be archived to keep un-read, or messages requiring action show in a *live window*.

The final items on the list of elements for integration are driver and vehicle information. All data is either event driven or driven by exception. Data overload is a danger; therefore, management summaries are essential for decision making, with detail being available should further investigation be needed. Information of driver habits e.g. over revving can be used to improve their performance – and reduce costs! If the driver can be alerted when he exceeds certain parameters, then he can react to adjust his behaviour immediately. Driver/vehicle information may include:-

- Driver log on,
- Start date/time,
- End date/time,
- Distance run in the period,
- Time of engine running,
- Time vehicle was moving,
- Engine warm-up time,
- Engine cool down time,
- Idle time,
- Overspeed,
- Over rev.

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Integration possibilities can now be identified. The data is produced – either by the dispatcher or by the driver. The main computer (hosting the communications package) will have a router module that filters the data required, packages it and posts it to the external application link (EAL) or data queue. From here the data is picked out by the relevant application e.g. Billing, Accounting Maintenance, EDI etc. The right data is selected for integration using macro messages. These are pre-formatted templates or *fill-in-the-blanks* messages that allow specific fields to be selected for data integration. For example, if a driver sends a macro saying that he has just delivered consignment no. 1234 and is now *empty*. The word *empty* can be recognised and can be posted to a map interface to change the icon for that vehicle on the map (possibly from red to green or from solid to outline). The word *delivered*, coupled with the consignment number may be posted to a consignment tracking software and to the billing software and an invoice may be raised automatically! Note that the fields of the macro are defined to match the database structure of the external application.

Satellite communication systems can be seen as a Wide Area Networks (WAN), but the user operates, in his office, as a Local Area Network (LAN). The network capability operates as an open system – for integration purposes – thus allowing access of information to a variety of agencies, at the discretion of the fleet owner. An example of a WAN could be the distribution of information between a manufacturing plant, operating to Just-in-Time (JIT) practice, and say four different transport contractors. For example, Carrier (A) sends messages, via the hub, to its own vehicles and to those owned by carriers (B), (C) and (D). Messages sent from (A)'s vehicles may be copied to the dispatcher of (B), (C) and (D) with only their positions reported to the plant. The plant can also be given access to view messages. The facility to allow them to send messages can be switched on or off. Thus, JIT deliveries are achieved with minimum disruption.

4. DEVELOPMENTS. Integration will be a major leap forward for most haulage companies, but it also opens other opportunities for system developers. There will always be a leading edge in technology. So where is this edge leading?

4.1. *Bar Code Reading*. Bar code reading has been in use for some time in supermarkets. Applying this technology to the transport industry, a driver affixes a bar code to a consignment as it is being loaded. Information contained in the bar code is relayed back to his base via Sat Com as a binary message, at the time of collection. The consignment is tracked via the vehicle position reports until it is delivered. Upon delivery, the bar code is scanned and a delivery macro is sent, confirming safe arrival and an invoice can be raised automatically. The same bar code can also track the consignment through the warehouse systems.

4.2. *Signature Capture*. Most customers of haulage companies want signed Proof of Delivery (POD). Technology can now give them what they want. Parcel delivery companies already use this system for consignment tracking. When a driver is touring Europe, he may be away for weeks at a time; he can lose PODs. The office can lose PODs. One company reported that at any one time as many as 10 percent of PODs are missing, many are never recovered. Using signature capture (by scanning a POD note) and sending this back to base – at the time of delivery – to be re-printed for attachment to a same-day invoice, should become standard procedure. Cash flow will be improved, and slow-payers will have little about which to argue.

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4.3. *Remote Control*. It is not suggested that we save the cost of hiring drivers. However, once a vehicle leaves the yard control of it can be lost. Remote control can provide up to the minute information on:

- The engine – e.g. access to engine management to alter performance,
- The trailer/reefer – e.g. monitoring temperatures throughout the load space and adjusting as required,
- The driver – monitoring hours, road speed to engine speed or even to local legal limit,
- Tyres – e.g. monitoring pressure and temperature and warning the driver if parameters are exceeded,
- Security corridors can be programmed, with off-route and unauthorised stops raising alarms in the office,
- Automatic updates of ETA by referencing present position with destination and previous estimated time to present position versus actual time.

4.4. *The Internet*. The Internet offers further opportunities, such as:

- Monitor a transport fleet from anywhere in the world,
- A-Z scale maps of the whole of Europe with the facility to view vehicles to the nearest lamppost,
- Secure Web Page showing consignment tracking for access only by customers using a password,
- On-line booking of loads.
- E-Mail direct to the cab.
- CAB CAM giving selectable views of load doors and cab doors; these can also be mounted inside a trailer for monitoring while loading and tipping.

4.5. *Other Developments*. The location of all trailers in a fleet either moving or not attached to a tractor can be tracked and their locations displayed on a PC screen.

5. FINAL THOUGHTS. This paper commenced by reviewing the last 20 years of communications. It then examined the benefits of using data in communications over voice. The emphasis was on integration of data and the benefits for the transport industry. Finally, the present developments and some exciting possibilities for the future were reviewed. Road hauliers should never stop trying to improve their business performance or their competitors will win the day. Technology can certainly help.

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