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Telematics Jammers – Addressing the Risk

Telematics jamming

The capacity for employees, contractors, consigners, insurers, to name a few, to monitor the safe movement of their vehicles and goods has been achieved through telematics, also known as In-vehicle Monitoring Systems (IVMS). Alongside the increased usage of telematics has been the emergence of 'jamming tools' which actively block the signal to / from the device. Anecdotally, this appears to be a growing issue in the United Kingdom where businesses with fleets have begun to be alerted to their use through discussions with their peers. Nick Croft from Road Safety Support has been championing awareness of IVMS jamming in the United Kingdom and was questioning the awareness and preparedness of Australian fleet managers.

What is telematics? ¹

Telematics systems offer opportunities to reduce accidents involving heavy vehicles by improving driver performance through tracking a vehicle's operation through a combination of GPS, sensors within the vehicle and interaction with a vehicle's onboard computer based on organisational and operational requirements. Comparisons can then be made against performance parameters as set by the organisation. The following areas are commonly monitored as part of such a system:

- usage and driver behaviour – i.e. harshness of braking and acceleration, speed, kilometres driven

- use of vehicle safety equipment – i.e. use of seatbelts, ESC
- vehicle location.

Telematics systems have a positive impact on driver behaviour, leading to a reduction in crash rates, speeding and distances travelled. Practical implications of the introduction of such a system include:

- ensuring adherence to authorised routes and road regulations
- reduced fuel consumption due to changes in driver behaviour and reduced distances travelled
- improvements to safety and risk management through real-time location tracking of vehicles.

What can cause GPS interference?

The GPS is made up of 32 satellites orbiting at roughly 20,000 km above the earth's surface. A GPS unit can determine its location by locking onto the signals of four or more satellites. The weakness of these signals makes them susceptible to disruption, which can occur due to:

- physical barriers to signals (urban canyon effect, tunnels) ²
- multipath interference as a result of signals reflecting off surfaces (terrain, buildings) ³
- poorly installed, unreliable or leaky systems
- deliberate interference through 'jamming' or 'spoofing'.

¹Land transportation safety recommended practice, Guidance note 12 (version 2) March 2014

²Precision of GPS in cities improved by 90 percent, Carlos III University of Madrid, February 12, 2013

³Multipath, J. Sanz Subirana, J.M. Juan Zornoza and M. Hernández-Pajares, Technical University of Catalonia, Spain, 2011

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How does telematics jamming⁴ and spoofing⁵ work?

As the signals used by GPS units to determine their location are relatively weak and the frequencies well documented, tools exist that can prevent a GPS unit from accurately determining its location. By transmitting signals stronger than those emitted by GPS satellites, GPS units can be:

- Jammed – stronger ‘noisy’ signals prevent the GPS unit from receiving satellite signals and determining their location.
- Spoofed – stronger signals result in the unit determining an incorrect location.

GPS signal jamming is of concern due to the ease with which it can be achieved. While illegal, a very small signal jammer with a range of approximately 10 m, powered by a truck’s cigarette lighter (Figure 1) can be purchased online for as little as \$25⁶.

The complexity of GPS signal spoofing relative to jamming is such that it is not as pressing an issue for the Australian transport industry at this time.



Figure 1: Typical portable GPS jammers powered by vehicle cigarette lighter (<http://www.insidegnss.com/node/2031>)

Reasons for concern

There are multiple potential uses for GPS jammers of telematics units, with incidents beginning to be reported in mainstream media. There is potential for:

- preventing the accurate tracking of vehicle usage (distance travelled, time on road)⁷
- preventing the calculation of driver behaviour metrics (acceleration, braking, time on road)
- blocking tracking of a vehicle leading to its theft or the theft of its cargo⁸
- blocking the tracking of a vehicle to allow for its use contrary to company policy.

⁴GNSS Jamming in the Name of Privacy, Potential Threat to GPS Aviation, Sam Pullen and Grace Xingxin Gao, Stanford University, March/April 2012

⁵UT Austin Researchers Spoof Superyacht at Sea, The University of Texas at Austin, Cockrell School of Engineering, July 29, 2013

⁶Taxi cheats using GPS jammers to steal fares, Karen Collier and Amelia Harris, Herald Sun, November 8, 2013

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Dealing with this issue

While the prevalence of jammer usage in Australia is unknown, hundreds of jammers have been seized and destroyed as a result of interception in the Australian mail system⁹. The small size of jammers as well as the possibility that GPS interference may be due to a legitimate cause presents a challenge when dealing with this issue. Irrespective of a driver's motivations or the level of negative impact, the use of jammers must always be seen as the deliberate undermining of a tool that enhances Australian road safety. Furthermore, as such actions are a wilful breach of common organisational health and safety practices, they are a marker of a broader behaviour that requires immediate management intervention. As such, organisations must develop clear and unambiguous guidelines regarding their use and the following should be considered by organisations in order to prevent GPS jamming of their IVMS systems:

- implementation of an educational process for drivers that explains the negative impacts of jammer use, the safety benefits of IVMS and a clear company policy on IVMS use
- clear vehicle usage policies that prohibit any interference with any installed system and the introduction of any foreign electronic equipment to the vehicle

- regular analysis of kilometres tracked by GPS compared to those that would be expected of the vehicle on a given route, noting that discrepancies may be a result of natural interference.
- regular analysis of GPS unit dropouts with respect to individual drivers, patterns of driver behaviour, routes travelled and vehicles used
- adding checks for GPS jammers to routine vehicle inspection procedures
- recognition that there is the possibility of legitimate GPS interference when conducting any investigation
- installation of telematics systems that can detect the use of jammers.

The development of handheld GPS jamming detectors offers new opportunities for the detection of jamming devices (Figure 2). Use of such detectors and regular checks for jammers as part of vehicle inspections offer other avenues for law enforcement to prevent jammer usage on Australian roads.



Figure 2: Handheld GPS jammer detector (<http://gpsworld.com/chronos-releases-handheld-gps-jamming-detector/>)

⁷N.J. man fined \$32K for illegal GPS device that disrupted Newark airport system, Steve Strunsky, The Star-Ledger, August 8, 2013

⁸Car thieves using GPS 'jammers', Charles Arthur, The Guardian, 22 February 2010

⁹Illegal mobile phone and GPS jammer crackdown by regulator yields results, Ben Grubb, The Sydney Morning Herald, July 17, 2013

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Legal status in Australia

Beyond preventing the effective operation of an organisation's telematics system, the operation, supply or possession of a GPS jamming device is prohibited under Australian law and can attract fines of up to \$255,000 or 2 years imprisonment. Causing interference that endangers the safety of others or results in substantial loss or damage can lead to 5 years imprisonment and a fine for organisations of \$850,000¹⁰. The ACMA and road authorities are currently undertaking random inspections for GPS jammers (Figure 3).

Impacts on wider society

Due to the sensitivity of the signals and the widespread use of GPS for many different services, jamming has impacts beyond preventing accurate operation of an organisation's telematics system; reported incidents include:

- disruption of trade records at London Stock Exchange as its clocks depend on GPS signals for accurate timing¹¹
- disruptions to navigation systems at Newark Airport by truck driver using jamming to avoid paying tolls¹².

For more information please go to:
www.nrspp.org.au



Figure 3: Australian Communications and Media Authority and RMS Inspectors conducting an inspection (<http://www.acma.gov.au/theACMA/engage-blogs/engage-blogs/Interference/On-the-road-tackling-GPS-jammer-use>)

¹⁰Mobile phone & GPS jamming devices FAQ, Australian Communications and Media Authority, August 7, 2014

¹¹Out of sight, Satellite positioning-data are vital—but the signal is surprisingly easy to disrupt, The Economist Newspaper Limited, July 27, 2013

¹²No jam tomorrow, Navigation: As the uses of satellite-positioning technology continue to grow, what can be done to stop deliberate and dangerous jamming of the signals?, The Economist Newspaper Limited, March 10, 2011