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September 2018

case study

Taking the Mesa 2 Rugged Tablet on the Road: Adding Efficiency and Versatility to Traffic Control System Design and Testing

Traffic signal design is a science. Signals help conduct an orderly flow of traffic, and are imperative to both vehicle and pedestrian safety. Mis-timed, malfunctioning, or poorly designed signal junctions can wreak havoc for population areas of all sizes.

There is a lot of detail and data that goes into creating and maintaining a well-functioning traffic control system, which is where Mr Dan Preece and his company, Integrated Traffic Services, shine (www.integratedtrafficservices.com). Since 2003, Integrated Traffic Services has specialised in traffic signal design and validation in the United Kingdom and Southern Ireland.

The work involves visiting junctions and roundabouts, connecting to on-street equipment, and collecting correct data to ensure that traffic flows efficiently and safely through each junction, or intersection. Due to changes in traffic control technology and the outdoor work environment, Mr Preece requires equipment that is agile, efficient, and versatile. As a leader in this technical field, he is often seeking out new, compliant equipment and testing it in the field. To make his work more efficient and accurate, Mr Preece found the perfect fit in the field-computing solutions of Juniper Systems Limited (www.junipersys.com).

BRIDGING THE TRAFFIC TECHNOLOGY GAP

Traffic control system design and validation is a several-stage process. First, a traffic signal junction – or an unsignalised junction that is intended to be signalised – is assessed, and measurements taken. Assessments include saturation flow of vehicles crossing the stop line, cruise speeds, number of vehicles, and many other variables. Details for detector placement and factors affecting site design are recorded.

Once those measurements are taken, a design is created, and Mr Preece offers recommendations to be used for building or configuring the traffic system. When implemented, he returns to the site to validate the system.

'We plug into the control system or traffic signal controller and observe driver behavior, altering parameters in real time, watching the effects. It's very involved and must be done on the street ', said Mr Preece.

Prior to wireless communications, connecting to the control system was done via an RS-232 serial interface. That required equipment such as a handset, laptop, pen and paper, and other items to be carried into the field.

Signals must be adjusted as traffic junctions experience heavier traffic flow. On this day, Integrated Traffic Services adjusted signals near an Airbus plant that manufactures and services aircraft wings.

The traffic signal systems near the Airbus plant operate via an RFID tag system, which lorry drivers activate to halt traffic temporarily as the lorry transports an aircraft wing – a very long load – to and from the main thoroughfare.

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'Previously in the design phase, I'd have to write down details on a piece of paper or the site drawing, or enter it into a laptop cradled in my arms, which isn't always easy when you're walking a long way up an approach for measurements', said Mr Preece.

As technology has progressed, more equipment has become web-interfacing, requiring a system that can handle a variety of connection types.

'Now we're looking at IP connections to some equipment', said Mr Preece. 'Controller manufacturers now have numerous methods for equipment communications. I deal with a lot of old equipment, so you need knowledge on how to connect and devices that are flexible enough to connect to both legacy and newer equipment'.

The Mesa 2™ Rugged Tablet from Juniper Systems Limited, based in Bromsgrove, U.K., was the answer to Integrated Traffic Services' needs. The Mesa 2 can connect to both traditional serial ports and new systems via Wi-Fi® – eliminating the need for other equipment in the field.

'The Mesa 2 is a fantastic, all-in-one handheld computer', commented Mr Andy Cray, U.K. sales manager for Juniper Systems Limited. 'It was designed to expedite data collection and work processes, reducing task time for all kinds of field work'. Connectivity via Wi-Fi allows for connections directly at the junction's problem areas, capturing necessary data right from the source.

Assessments and site work require a device with a Microsoft® Windows® operating system. To effectively manage and adjust the numerous traffic controls, a variety of software must be used. The Mesa 2 also provides fast access to previously recorded information and design documentation.

'That documentation is so essential', Mr Preece related. 'During the validation phase, the Mesa 2 is more than just a terminal to connect to traffic signals. It's a handheld computer that lets me open a Word or Excel document with details about how the junction should work. I can quickly check a phase or input number, rather than referencing it on paper or a laptop. I just tap and switch between windows on the Mesa 2'. He further explained, 'Due to the size of the device, I don't have to stay by the controller cabinet when validating; I can view data and walk around the approaches at the same time.'

Mr Preece related an interesting story:

> On a recent scheme, I was connected to the controller over Wi-Fi. I walked up an approach to find a detector, and verified its proper operations by analysing the controller data on the Mesa 2 in real time. Then I amended the dataset based on the detector location, marked up the site drawing's PDF, uploaded the revised dataset to the controller, and monitored the effects – all from the side of the road, 200 metres away from the controller cabinet.

Traffic control technology is very complex, and usually merges multiple systems, such as controls for pedestrian crossings, turns to a specific direction, bypasses for emergency vehicles, and oversized commercial loads.

Mesa 2™ Rugged Tablet

- Rated IP68, waterproof and dustproof
- Shockproof, withstands temperature swings
- Microsoft® Windows® or Android® OS
- Li-ion battery provides 8-10 hours operating time
- Optional internal battery offers 4-5 more hours
- Multiple wireless connectivity options
- 7-inch display with capacitive touchscreen
- IllumiView™ technology delivers amazing visibility
- 4 GB RAM; 64 GB or 128 GB flash storage

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> While this work could also be achieved with a laptop, it's very uncomfortable to walk around a site holding one. Because the Mesa 2 is rugged, I don't worry about dropping it and I can put it down on rough ground. It's made the job easier and is even changing the way I accomplish my tasks. ”

A WORKHORSE ON THE ROAD

Working on the roadside in the U.K. comes with many challenges. Weather, terrain, and device safety are all variables that Integrated Traffic Services must consider when selecting equipment. The work requires long days, and therefore, long computing time.

The Mesa 2 is designed to handle virtually any environment, making it perfect for the wet weather conditions of the U.K. Rated IP68, it withstands dust, dirt, sand, and rain, and is resistant to water submersion up to 1.5 metres for up to 30 minutes – in case it falls into a puddle or a duct chamber full of water. The high-visibility, 7-inch touchscreen provides superior clarity, and is capacitive, so it keeps working in any weather or temperature conditions. The work continues, even with rain on the display.

The high-capacity battery in the Mesa 2 has power to operate with the screen in use for up to 10 hours, with up to five more hours of operating time from the optional internal, hot-swap battery. 'The battery will easily last a long day without the performance level declining or the screen dimming', said Mr Preece.

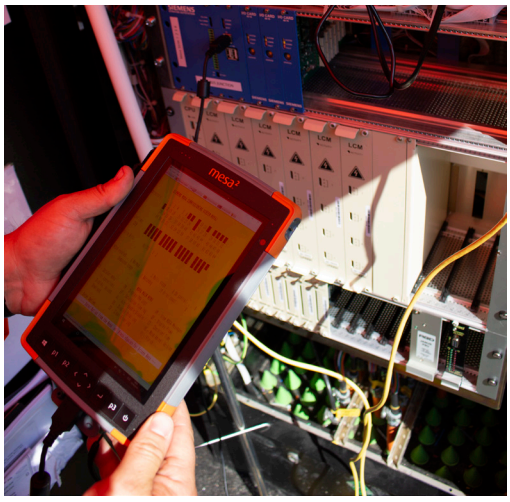
'Weather in the U.K. is fickle at best', said Mr Cray. 'You're often caught in the weather. With the Mesa 2, there's no worries; you can keep working even when it's raining'.

Mr Preece added, 'I used to go through laptops like A4 pads! And yes, my Mesa 2 has had a thorough soaking on several occasions. But with the Mesa 2 you just blow the rain off and carry on'.

City environments with traffic junctions pose even greater challenges. Laptops can be prone to theft and attract undesirable attention, while the Mesa 2 is less appealing. Said Mr Preece, 'You want your computer to be protected if you put it down – less prone to theft and not attracting attention. That's really useful about the Mesa 2. It looks like a work device and can be kept with you everywhere because it's so compact'.

Overall, projects are much more efficient thanks to the Mesa 2. 'I was at a job with seven junctions to evaluate. Every time I saw something that needed to be changed, I plugged in the Mesa 2 and had a look. It was a real benefit having all that documentation from the scheme folder on the Mesa 2 – the job finished much quicker'.

The Mesa 2 Rugged Tablet connects directly to the traffic control equipment…



…and displays the timing, functionality, and performance of multiple systems.

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GIVING THE GREEN LIGHT TO THE MESA 2

For Mr Preece, the Mesa 2 has been an invaluable improvement to his field gear. 'It was the only handheld computer we found that had all the features, operating system, and right kind of layout to be useful on the street', he said.

Mr Preece also uses the device on fault-finding and troubleshooting assignments. 'I go to junctions where there is poor performance reported', he relates. 'It's similar to validation, where I need a device that will connect with whatever equipment is there, and stand up to the elements and abuse that on-street equipment is subjected to'.

At the cutting edge of the industry, Integrated Traffic Services perform a lot of development work, and Mr Preece sings praises for the Mesa 2 at presentations and seminars. Based on his experiences with it, he sees a bright future with preconfiguring the Mesa 2 with software needed by others in the industry.

'It works extremely well. It's been a useful bit of kit and really enhanced the way I work.'

Compact and ergonomic in hand, the Mesa 2's display is readable even in brilliant sunshine.

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ABOUT JUNIPER SYSTEMS LIMITED

Based out of Utah, U.S.A., and Birmingham, U.K., Juniper Systems designs and manufactures ultra-rugged handheld computers and provides field data collection solutions for use in extreme environments. Since 1993, Juniper Systems has provided innovative mobile technology to the geospatial, GIS, industrial, natural resources, utilities and public services, energy, and military markets.

Integrated Traffic Services Ltd

Specialist consultancy to the road traffic industry

ABOUT INTEGRATED TRAFFIC SERVICES

Integrated Traffic Services, Ltd, offers specialist consultancy services to the road traffic industry. They have been serving clients in the UK and Ireland since 2003. Specialising in adaptive control of signalised junctions and roundabouts, they are at the cutting edge of developing control methodology and techniques in the field. Director Dan Preece is active in the industry, offering training, advice and presenting papers on the interesting projects he regularly faces during his work.