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COUNTING PASSENGERS VIA THE CLOUD

Eurotech has provided a cloud based automatic passenger counting (APC) system for TEB, a tramways operator running the busy line from Bergamo to Albino in Italy. This system uses Eurotech's Everyware Device Cloud (EDC) to facilitate the data delivery from the mobile devices installed on the trams and a Cloud Computing base application for Data Statistics. The system demonstrated impressive accuracy during the testing phase.

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The T1 Tramway, operated by TEB (Tramvie Elettriche Bergamasche) runs between the Northern Italian towns of Bergamo and Albino, taking in 16 stops along the way. It is an important community asset and subject to peak usage by commuters.

Accurate statistics are continuously required on the number of passengers using the T1 Tramway to identify the travel peaks and troughs. Eurotech's Passenger Counting device allows for real time planning of the route in order to optimise the use of the fleet, ensuring that the trams are on hand when needed and are not sent out to travel empty when the demand is not there.

The public tendering process for the TEB project was launched in November 2010 and Eurotech gained the contract through being able to satisfy specific and challenging requirements. The first was stringent accuracy of the DynaPCN, formerly referred to as Passenger Counter, PCN-1001.

MEETING THE ACCURACY TARGET

Counting is carried out on passengers entering and exiting the tram using the vision processing technology within the DynaPCN passenger counter installed at each door. These stereoscopic camera sensor devices include digital inputs to verify door status and RS485 for communication with the Passenger Counter Gateway mounted on the tram. This platform, which includes

Fast Ethernet, GPS, 3G and WiFi, acts as the launch pad for the next stage in the information transfer process via the EDC cloud.

The accuracy test took over three days to complete and involved 50 outbound and return trips on the T1 Tramway route. In all, over 8,000 passengers were counted and Eurotech proved to achieve and exceed the high degree of accuracy required to meet TEB's target without any kind of data post-processing.

One of the ways in which this high level of accuracy is achieved is through the DynaPCN's ability to judge situations where high passenger volumes are involved. People frequently remain standing in the detection area rather than moving on through the tram when the doors open and the system's capabilities to differentiate between a new intake and existing passengers is all important.

The DynaPCN units are robust, with a low power requirement and are flush mounted making them virtually unnoticeable. They are designed to be used in harsh environments, offering dust and liquid ingress protection to IP65 and EN50155 T1 compliance working over an extended temperature range of between -25°C and $+70^{o}$C . This device is the beginning of a chain of technology that brings vital data in real time to the transport operator in an easily accessible and useable form.

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MINUMUM COST – MAXIMUM FLEXIBILITY

Eurotech has been involved over many years with the supply of passenger counting systems for bus and train networks throughout the world. The system being used by TEB for the T1Tramway builds upon this legacy , adding real innovation in the field due to its use of cloud computing in place of a capitalised communications and server infrastructure.

Frequently new developments are born through the need to satisfy specific customer demands and this case is a good example. On top of the requirement for a high level of accuracy, TEB was determined that the following criteria should also be met:

- The chosen system should not involve them in heavy infrastructure costs
- This cost effective system should be scalable to future requirements of the tram fleet

This is becoming an increasingly important consideration for customers across a range of industries. As the demand for real time, accurate data from remote and diverse assets increases, organisations increasingly need an elastic, scalable infrastructure to bear, route, archive and serve the data, but are often unable to afford the capital costs of installing such a system, especially given that in many cases this infrastructure is a pre-requisite before even the first remote device can be added. A device to cloud configuration provides the answer, and Eurotech offers a totally flexible system to its customers at a fixed monthly rental and with no up-front infrastructure costs whatsoever.

Cloud computing provides an internet-based solution offering shared resources on demand, similar to an electricity grid. It was developed through the internet's ability to provide ease of access to remote computing sites, while at the same time providing complete security of data. The result of its use has revolutionised organisational capabilities in sectors ranging from financial services to healthcare.

The Eurotech Everyware Device Cloud is an end-to-end solution that includes purpose-built hardware, connectivity and device management through the Everyware Software Framework, the Everyware Device Cloud Client and Everyware Cloud services to deliver actionable data from the field to downstream applications and business processes, dashboards, and reports. This infinitely

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scalable and cost-effective methodology provided the final element in the communications solution provided by Eurotech for TEB. The cloud is a means to support the customer with a technology infrastructure that requires no need for user expertise or control. Access to a wealth of real time and statistical information is available to the customer any time and from anywhere via secure access protocols. Data security is further enhanced by the redundancy inherent in the EDC offering.

The DynaPCN system supplied for the T1 Tramway from Bergamo to Albino provides a blueprint for a range of potential transport applications. Eurotech's expertise and resources to provide device to cloud solutions will open many opportunities for flexible and scalable responses to future transport network demands.

For more information on Eurotech's cloud solution please visit our website eurotech.com or contact our sales team at sales.emea@eurotech.com.