



With rapid development of new technologies and the increasing rise of urbanization, the demands of transforming transportation systems into technologically advanced vehicles are growing rapidly. Recently, CTC Union has several successful cases of adopting "smart bus" systems for public mass transportation. For example, buses or minibuses are being equipped with multiple networking devices such as 4G WiFi router, passenger information display, surveillance cameras, electronic ticketing, GPS tracking, etc. By using "smart bus" system, not only are passenger experiences optimized by providing networking services in innovative and cost-effective ways, but also real-time data collection, such as fare records, passenger flow and road conditions will enable future improvements and planning. When selecting appropriate networking devices to build up convenient and efficient "smart bus" systems, there are a few factors that need to be taken into consideration.

## Challenges

- The network devices placed in buses often operate in harsh environment where vibration is common when vehicles are moving.
- Passenger services and safety are enhanced on buses by employing various networking devices, such as 4G WiFi router, information display system, in-vehicle cameras, etc.
- Power sources are limited on buses.
- Networking devices should be able to upgrade easily for future scalable purposes.

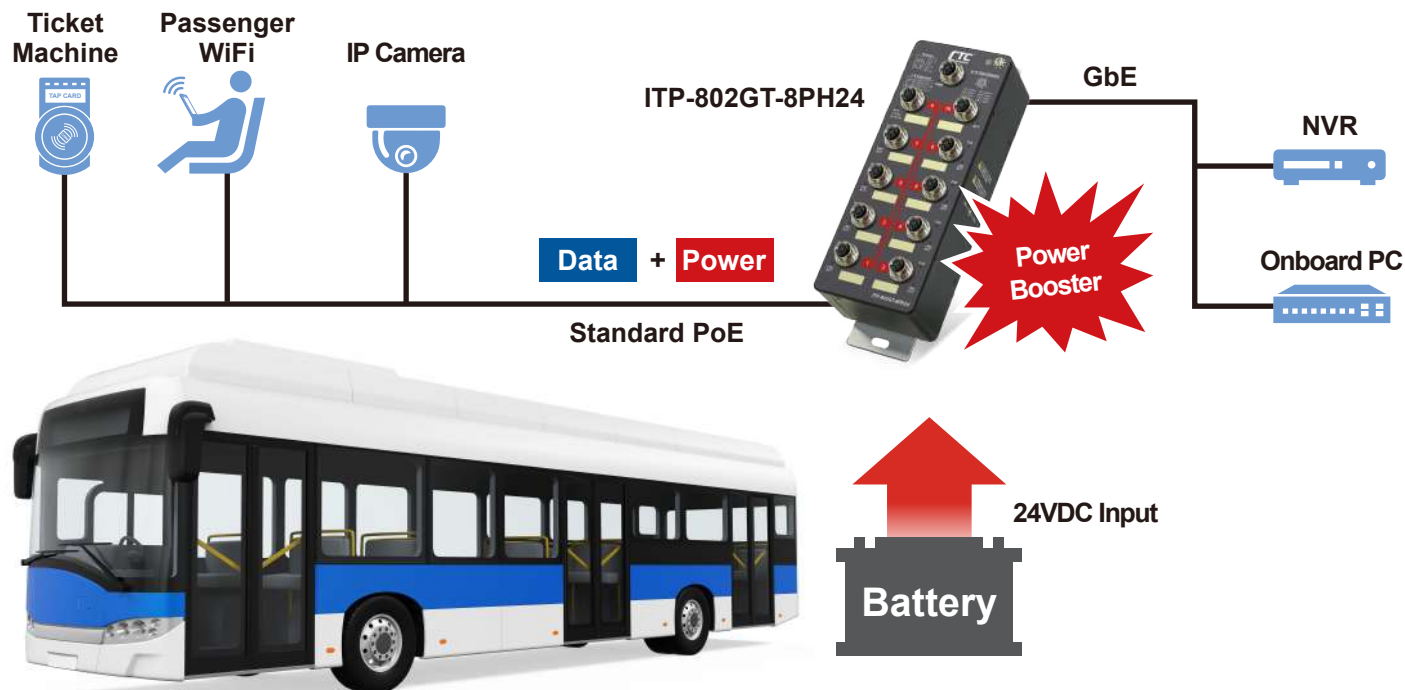
## CTC Union's Solution

CTC Union, with abundant experience in providing networking solutions, offers a comprehensive range of network devices targeted at Intelligent Transportation Systems (ITS) applications. Our intelligent bus solutions are designed to provide uninterrupted and reliable network services of many kinds to eventually enhance passengers' experience and integrate operational information into a management systems for future analysis or planning. Major features of the proposed network devices that are crucial to building up successful smart bus systems are as follows:

- Network devices of ITP series are all IP products that are easily connected to other devices and easy to upgrade for future network expansion planning.
- Network devices of ITP series provide power over Ethernet (PoE) function so that there is no need for powered devices (PD) to run extra power cabling.
- Network devices of ITP series support 24VDC power input and can boost PoE output voltage to 50VDC.
- ITP series all support wide range of operating temperatures (-40~70°C) with rugged design.
- ITP series provide industrial grade EMI and EMS certification to offer better protection against unexpected lightning strikes, ESD or surges.
- With M12 and M23 connector design, ITP devices are designed to withstand severe shock and vibration, making them reliable for uninterrupted communication in moving vehicles.

## Application

In this application, an ITP switch that is connected to 24VDC battery source can provide power over Ethernet (PoE) to connected powered devices (PD) such as in-vehicle surveillance camera, 4G router, NVR, passenger information monitor. These PDs can function smoothly without using extra power connections.



## Products



**ITP-802GT-8PH24**

2x Gigabit M12 + 8x 10/100Base M12 with 8x PoE  
(120W, 24/48VDC)



**ITP-800A-8PH24**

8x 10/100Base M12 with 8x PoE  
(120W, 24/48VDC)

• The specification and pictures are subject to change without notice.



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