White Paper

How to manage IP under IEC 61375-2-5 applications

Version 1.1
Jan 4, 2022

Regarding IEC 61375-2-5

IEC61375-2-5 is an Ethernet based control system and will form the core communication technology of future highspeed trains, the development of highspeed trains is becoming more rapid & the demands placed on the onboard network is increasing to higher levels of network traffic than ever before. Systems such as Surveillance, onboard announcements, station information, seat reservation systems etc. are all provided via the Ethernet system. These increasing demands placed on the existing train networks is something they cannot fulfill.

The IEC 61375-2-5 standard is released by the International Electrotechnical Commission (IEC). It defines the ETB (Ethernet Train Backbone) for Ethernet technology to follow on train network applications.

What is TTDP?

Train Topology Discovery Protocol, also known as TTDP, is designed for train dispatch. When train cars are re-arranged in order, the IP of the Ethernet switches in the train car will also change. An ETBN (Ethernet Train Backbone Network) switch with TTDP function will re-arrange the IP address and Gateway IP when the train network topology is changed due to train car re-arrangement.

Limitations of TTDP

TTDP can only manage the IP assignment of the Ethernet switches and cannot manage the devices connected to the switches. Thus, when the train cars are re-arranged, **TTDP can only change the IP addresses of the switches without changing the IP addresses of connected devices**. Under the Ethernet structure, the IP address of the devices should be managed by the DHCP protocol. That's why Lantech have developed DHCP for TTDP.

DHCP for TTDP for device IP management

Under the DHCP standard, a DHCP server has to build a DHCP Pool for assigning the IP address for its DHCP clients and each DHCP client can get the IP within this Pool. The IP of the DHCP server must be fixed and be under the same network segment with the DHCP Pool since the DHCP protocol is designed for communication between client and server via broadcast packets. The TTDP standard only manages the switch's IP. The TTDP doesn't assign IPs to devices connected to the switch.
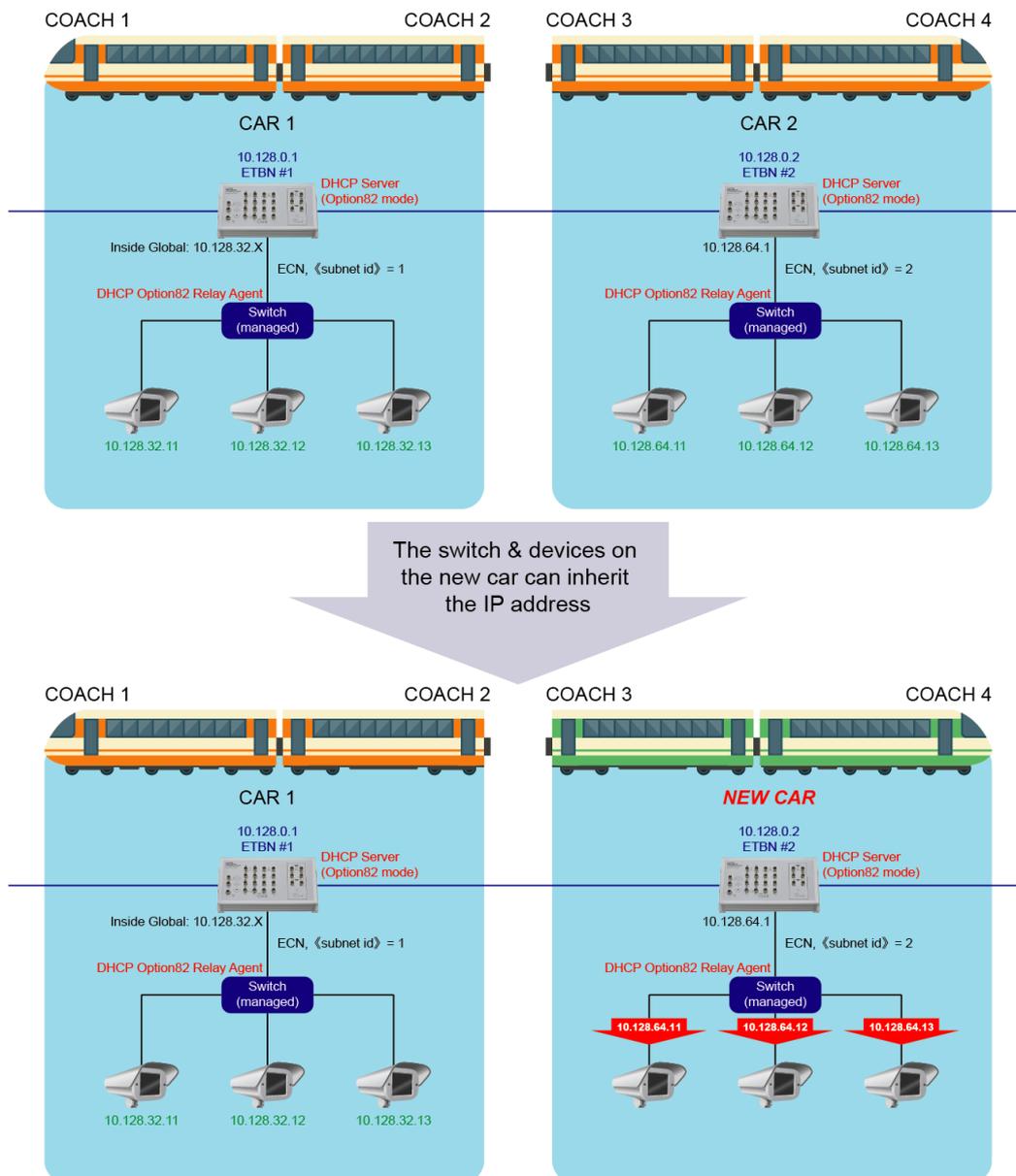
Figure 1 – DHCP for TTDP topology, when car 2 is replaced by a new car, the switch & devices on the new car can inherit the IP address

With Lantech's DHCP for TTDP technology, when the IP of the switch is re-assigned by TTDP due to train car changes, the switch will reserve a new IP automatically and compile a new DHCP Pool for its DHCP client. This technology ensures the DHCP client can connect to the new ECN (Ethernet Consist Network) network via IP. Lantech's DHCP for TTDP technology can also be combined with Port based DHCP or DHCP Option 82, which means, if the end device connected to the switch needs to be replaced, the new device can inherit the IP assigned by simply connecting it to the same switch port.
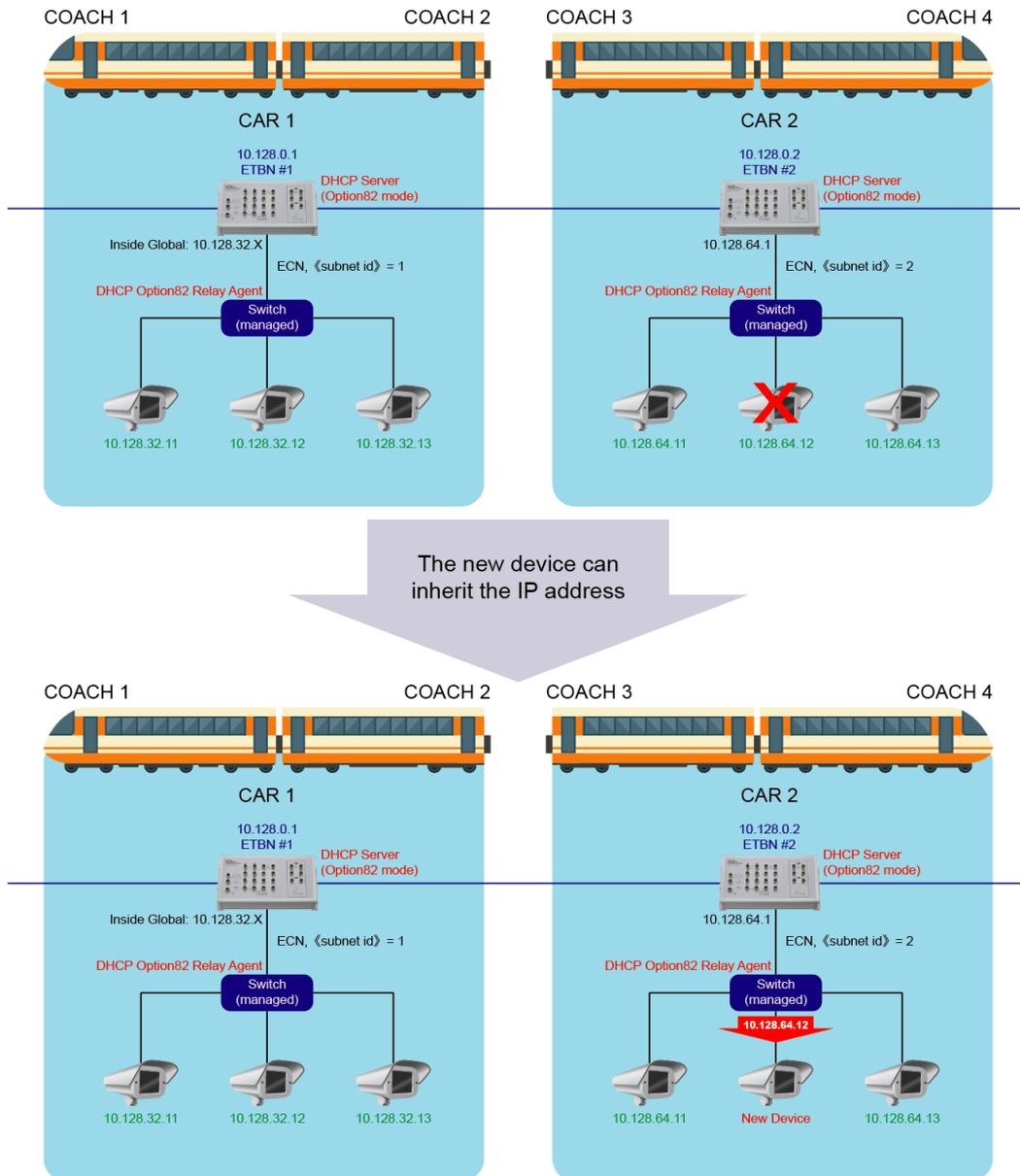
Figure 2 – DHCP for TTDP topology, when a broken device is replaced, the new device can inherit the IP address

When a new train car is added, the switch will calculate automatically and add the domain for the new train car after the switch is rebooted.
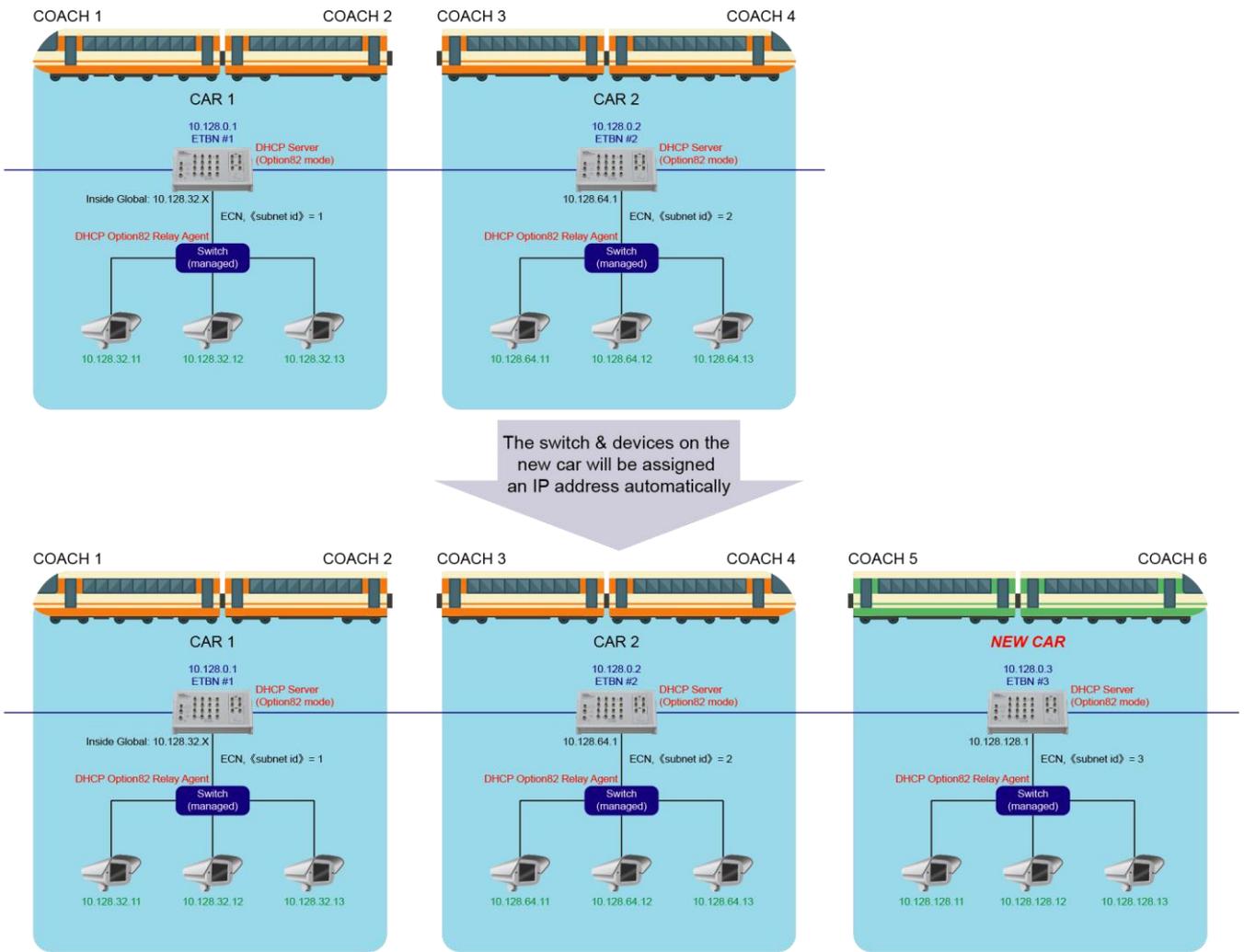
Figure 3 – DHCP for TTDP topology, when a new train car is added, the switch & devices on the new car will

be assigned an IP address automatically

Recommended Lantech IEC 61375-2-5 Ethernet Switch Models

T(P)GS-R6804XT 4 x 1G/2.5G + 8 x 10G Copper, EN50155 IEC 61375 (PoE) Ethernet Switch	**T(P)GS-R6616XT** 16 x 10/100/1000T + 6 x 10G Copper, EN50155 IEC 61375 (PoE) Ethernet Switch	**T(P)ES-L6424XFT** 24 x 10/100TX + 2 x 10G Copper + 2 x 10G Q-ODC fiber, EN50155 IEC 61375 (PoE) Ethernet Switch
T(P)GS-L6416XT 16 x 10/100/1000T + 4 x 10G Copper, EN50155 IEC 61375 (PoE) Ethernet Switch	**T(P)ES-L6416XT** 16 x 10/100TX + 4 x 10G Copper, EN50155 IEC 61375 (PoE) Ethernet Switch	**T(P)GS-L5408MGTA** 8 x 10/100/1000T + 4 x 1G/2.5G Copper, EN50155 IEC 61375 (PoE) Ethernet Switch

View All Lantech IEC 61375-2-5 supported models

About Lantech

Lantech Communications Global, Inc. is an IRIS-certified company as well as a member of ITxPT. Lantech designs and produces a complete family of industrial networking products. For decades, Lantech has provided professional and powerful industrial networking solutions globally.