

# Design scheme of high altitude cable car WiFi MIMO hi-mobile wireless monitoring transmission system

+ With IP67 high temperature resistant mobile backup DC UPS power supply system +

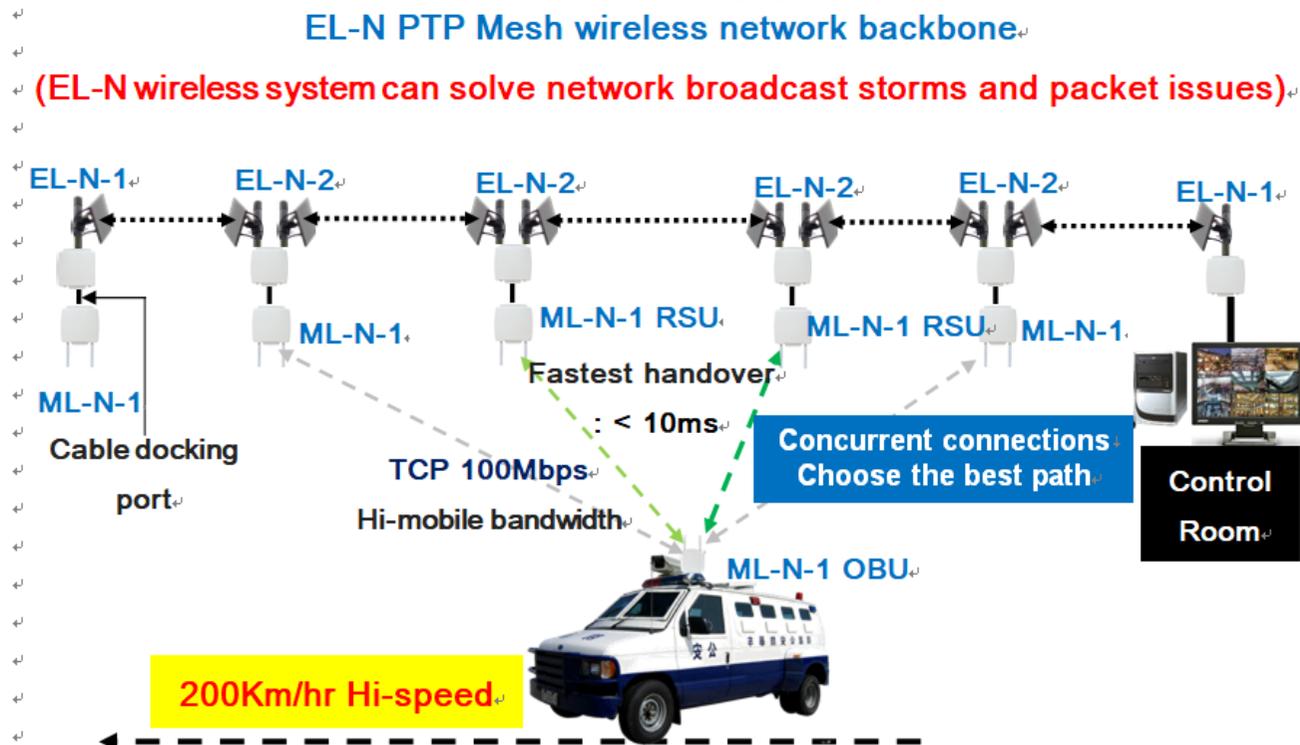
--WiFi wireless information highway application--

## 1. Planning purpose

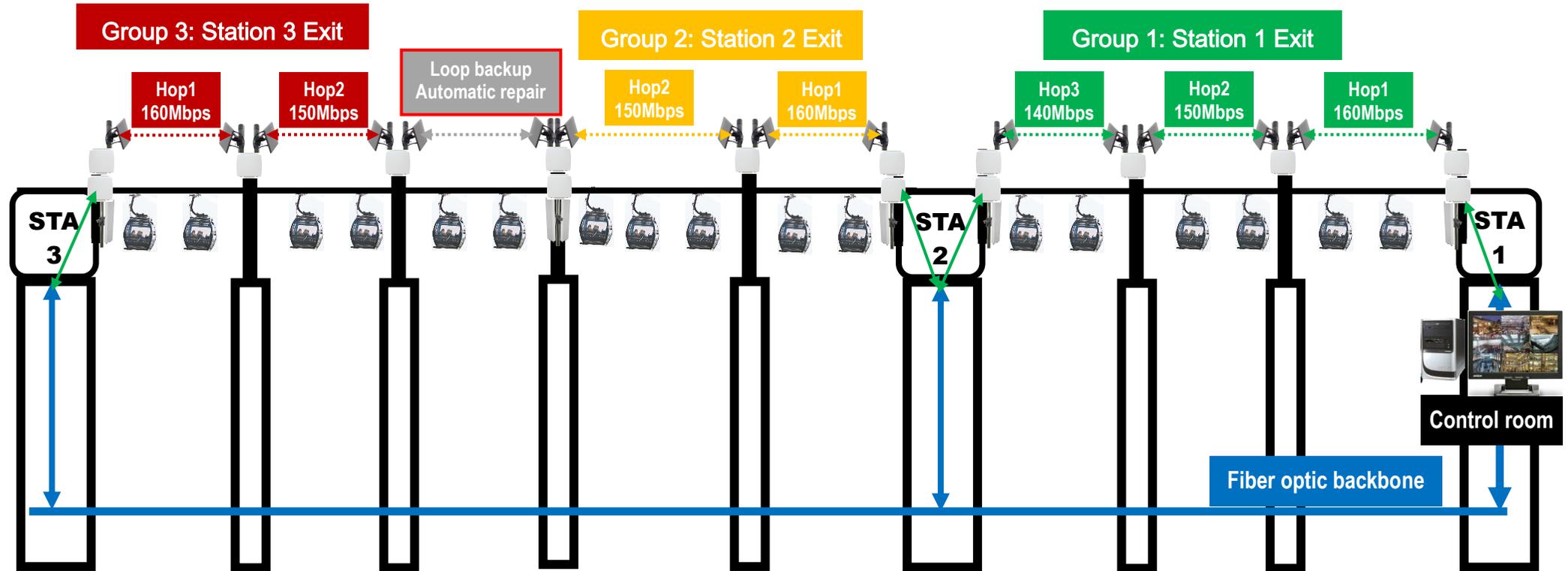
1. Set up a Speed Dome fast ball above the tower of the high-altitude cable car, which will perform real-time monitoring of the cable car and cables, and collect it in the video surveillance management center through wireless transmission.
2. Each digital camera is installed in the cable car to collect the internal conditions of the cable car during operation. The wireless transmission is collected in the real-time video surveillance management center.
3. Each digital emergency video intercom system can be installed in the cable car. The video surveillance management center can instantly broadcast notification to all cars or designated cars through the wireless transmission system and communicate with the designated cars.
4. By setting up the [PTP MESH wireless relay platform jumping backbone transmission system], and then combining with [High-speed Mobile Wireless Transmission System], it can form the "PTP MESH / WiFi wireless information highway system" to provide various digital information transmission applications and Back-end data management, including the application of various detection systems and AI intelligent systems and IoT ...
5. Provide station, pier, tower column, through [high temperature resistant explosion-proof DC UPS backup power supply system for grid power supply] and [outdoor special high temperature resistant explosion-proof DC UPS mobile power supply system] or [solar rainy day DC UPS power supply system] Carriages ... Operating power for equipment in other locations.

## 2. Planning needs

1. The high-altitude cable car system has a total of 6 stations (4 stations, 2 corner stations) and 25 piers and 47 towers. The total length is 4.03 kilometers, which is slightly 7-shaped. A total of 147 cable cars. Set up suitable surveillance cameras and emergency video intercoms at designated stations and pier or towers or carriages.
2. At each site is a group. Cameras, emergency video walkie-talkies, and other equipment that require data transmission are collected at the site. Each site has fiber optic drop points and exits. All sites The optical fiber exits are then gathered in the video surveillance management center, so that it can provide a bandwidth of about 300Mbps (or more) per site, which can meet the bandwidth traffic requirements of about 30-50 cameras in the site group. (In the future, you can use 802.11ac technology to upgrade to higher bandwidth.)
3. Adopting a double-layer wireless transmission system design, the upper layer is the wireless transmission backbone, and the lower layer is a high-speed mobile wireless transmission system, as shown in the following figure:



### 3. 【PTP MESH wireless relay platform jumping backbone transmission system】 architecture design of high-altitude cable car system

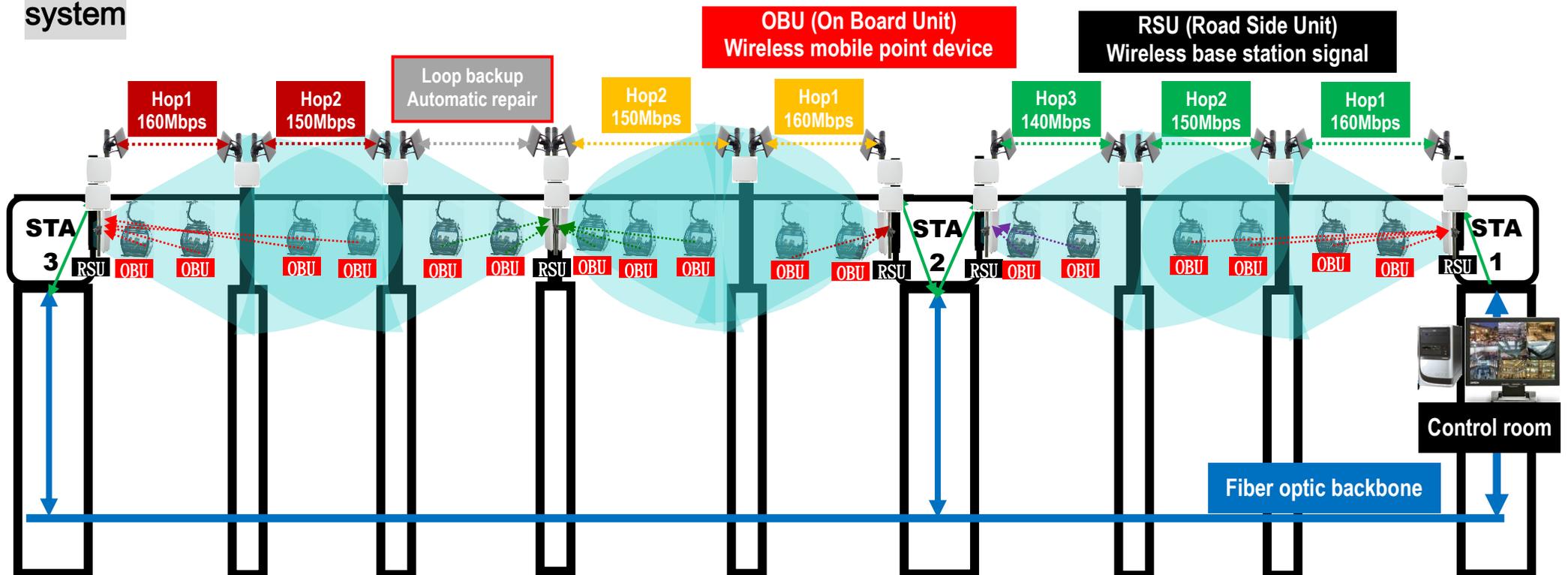


#### Design Notes:

1. Double-layer wireless system architecture: upper wireless backbone transmission, lower high-speed mobile signal coverage
2. Each station acts as an internal network exit: after passing through several wireless relay stations, the data will be transfer to nearby stations.
3. Each station is designed with several relay hops to form a small group landing scheme, which can achieve a bandwidth of 150Mbps to 300Mbps for each small group.

4. Can play the main backbone or backup backbone through the physical wired optical backbone; of course, the wired optical backbone is not required, and only the wireless backbone plays the overall transmission bandwidth. (May require 802.11ac to act as a wireless backbone to increase the total bandwidth of the wireless backbone)
5. The upper layer adopts PTP MESH wireless circuit backup backbone, which can be designed in advance for disconnection backup mechanism
6. The landing exit of the backbone of the upper wireless platform can be designated as the transmission exit or priority exit by transmitting Cost parameters.

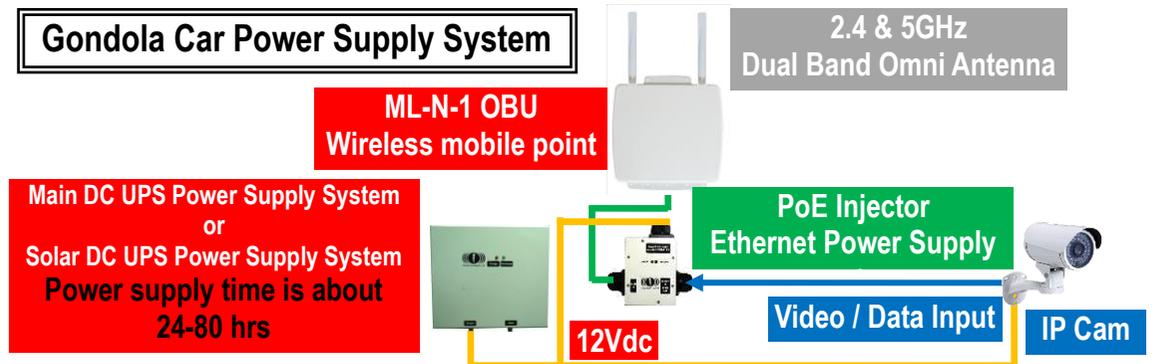
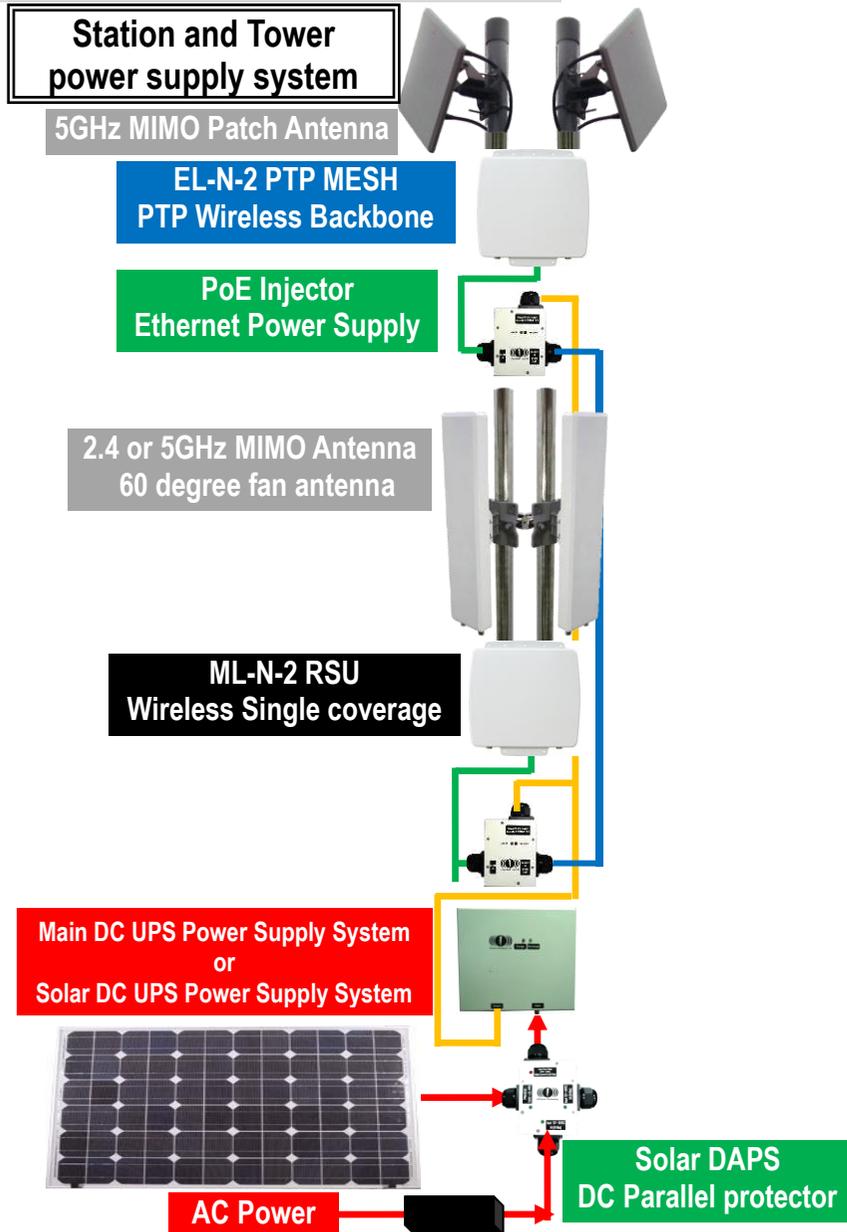
#### 4. 【PTP MESH hi-mobile wireless transmission system】 architecture design of simulated aerial cable car system



## Design Notes:

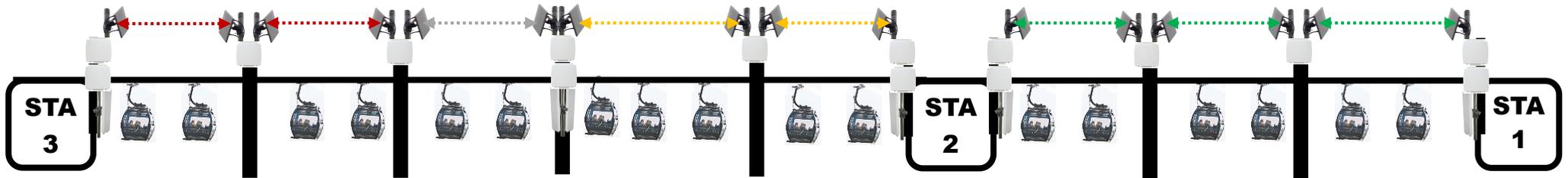
1. Lower-layer high-speed mobile wireless signal coverage RSU: Provides 2.4GHz or 5GHz wireless signal coverage.
2. The cabin of the cable car needs to be equipped with a wireless mobile point device OBU: OBU will automatically detect all RSU wireless signals in the environment, and determine the best transmission path to transmit data through the calculation and judgment of the built-in software. Independent judgment and independent operation.
3. OBU can conduct smarter communication and logical judgment with RSU, making the connection more stable and faster (non-roaming mode).
4. OBU connection switching between many RSU base stations, the switching speed can reach below 50ms, and the bandwidth can reach above 50Mbps
5. OBU can make smarter judgments and handover actions based on changes in wireless RSSI signal strength or Data Rate, or the number of successful connection communications and other parameters.
6. The transmission distance between the RSU and OBU is recommended to be within 300 meters; the distance between the towers is preferably 500 meters; the signal overlap area is preferably at least 100 meters

## 5. 【High temperature and explosion-proof DC UPS mobile power supply system】 architecture design of high-altitude cable car system



## 6. 【Wi-Fi MIMO hi-mobile wireless monitoring transmission system】 architecture equipment list simulation of high-altitude cable car system

- The high-altitude gondola system has a total of 6 stations (4 stations, 2 corner stations), 25 pier and 47 towers, with a total length of 4.03 kilometers and a slightly 7 shape. A total of 147 cable cars. Set up suitable surveillance cameras and emergency video intercoms at designated stations and pier or towers or carriages.



- WiFi MIMO high-speed mobile wireless monitoring transmission system equipment list



Product Modle:



EL-N-1/ML-N-1



EL-N-2/ML-N-2



EL-N-3/ML-N-3



Product Modle:

IOP-PANFO-5M2001213



Product Modle:

IOP-SANFO-2M1406013

➤ **6 stations:**

- EL-N-1 \* 10 units
- ML-N-1 (RSU) \* 10 units
- 5GHz 18-20dBi dual polarized MIMO patch antenna \* 20pcs
- 2.4GHz or 5GHz dual-polarization MIMO sector antenna \* 20pcs (or 5GHz 18-20dBi dual-polarization plate antenna \* 20pcs)
- Waterproof hot-melt tape \* 10 rolls

➤ **25 piers: Simulate erection of 4 piers**

- EL-N-2 \* 4 units
- ML-N-2 (RSU) \* 4 units
- 5GHz 18-20dBi dual polarized plate antenna \* 8pcs
- 2.4GHz or 5GHz dual-polarization sector antenna \* 8pcs (or 5GHz 18-20dBi dual-polarization plate antenna \* 8pcs)
- Hot-melt tape \* 8 rolls

➤ **47 towers: simulate 10 towers**

- EL-N-2 \* 10 units
- 5GHz 18-20dBi dual polarized plate antenna \* 20pcs
- Hot-melt tape \* 5 rolls

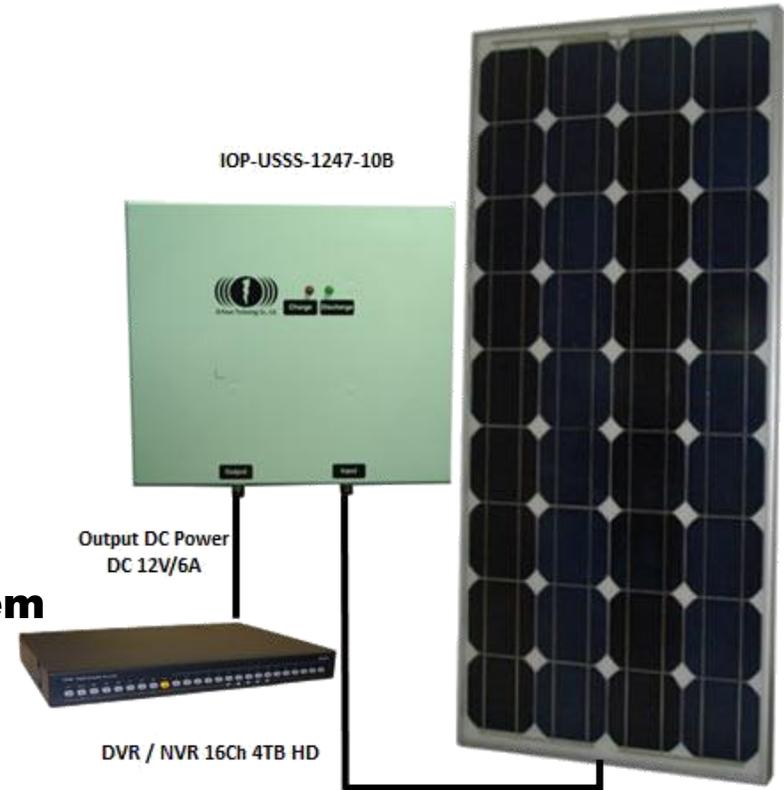
➤ **147 cable cars: one wireless device is required for each car**

- ML-N-1 (OBU) \* 147 units
- 2.4GHz & 5GHz dual-frequency omnidirectional antenna \* 294pcs
- Hot-melt tape \* 30 rolls

# Equipment list of high temperature resistant explosion-proof DC UPS mobile power supply system



**Product Model: IOP-USSP-1247-10B**



Solar Panel  
100~140W  
12V~28V  
5~8A

## ➤ 6 stations: mains-type DC UPS power supply system (or solar-type DC UPS power supply system)

- EL-N-1: Power consumption 6W / H
- ML-N-1: Power consumption 6W / H
- Power consumption of the whole system: 12W / H
  - It is recommended to design the battery power capacity (40hrs of power supply):  $12W / H * 40H * 125\% = 600WH$
  - Recommended product model: IOP-USSP-1247-10B 594 WH (46.4Ah @ 12.8V) about 3564VA (3.5KVA)
  - Recommended number: 10pcs

## ➤ 25 pier erections; 4 pier erections: Mains DC UPS power supply system (or solar DC UPS power supply system)

- EL-N-2: Power consumption 10W / H

- ML-N-2: Power consumption 10W / H
- Power consumption of the whole system: 20W / H
  - It is recommended to design the battery power capacity (40 hours of power supply):  $20W / H * 40H * 125\% = 1000WH$
  - Recommended product model (set of two): IOP-USSP-1247-10B 594 WH (46.4Ah @ 12.8V) about 3564VA (3.5KVA) \* 2
  - Recommended number: 8pcs

➤ **47 towers simulating erection of 10 towers: mains DC UPS power supply system (or solar DC UPS power supply system)**

- EL-N-2: Power consumption 10W / H
- Power consumption of the entire system: 10W / H
  - It is recommended to design the battery power capacity (40 hours of power supply):  $10W / H * 40H * 125\% = 500WH$
  - Recommended product model: IOP-USSP-1247-10B 594 WH (46.4Ah @ 12.8V) about 3564VA (3.5KVA)
  - Recommended number: 10pcs

➤ **147 cable car cabins, each cabin needs one wireless device: mains DC UPS power supply system (or solar DC UPS power supply system)**

- ML-N-1: Power consumption 6W / H
- IR IP Cam camera power consumption: 6W / H
- Power consumption of the whole system: 12W / H
  - Recommended design battery power capacity (40 hours of power supply):  $12W / H * 40H * 125\% = 600WH$
  - Recommended product model: IOP-USSP-1247-10B 594 WH (46.4Ah @ 12.8V) about 3564VA (3.5KVA)
  - Recommended number: 147pcs