The background of the slide is a close-up photograph of a person's hands placing a single red puzzle piece into a larger assembly of white puzzle pieces. The puzzle pieces are interlocking and arranged in a grid-like pattern. The hands are visible at the top and bottom of the frame, with fingers carefully positioning the red piece.

# **Lesson learning for hardware installation and engineering survey**

## Course targets

After taking this course, you will be able to

- Abnormal case Lesson learning



## ■ Part-1



# Case 1 - Outdoor overhead wiring

H3C

**Case:** Some ports of a product were damaged after a thunderstorm.

**Root cause :** After on-site inspection, it was found that overhead flying network cables between buildings are very common.

**Solution:** Try to avoid outdoor wiring. If it is unavoidable, if it is impossible to lay all outdoor cables underground, the overhead cables should pass through a metal pipe 15 meters before entering the room, and both ends of the metal pipe should be grounded. After the cable enters the room, a signal arrester should be installed at the corresponding interface of the equipment.

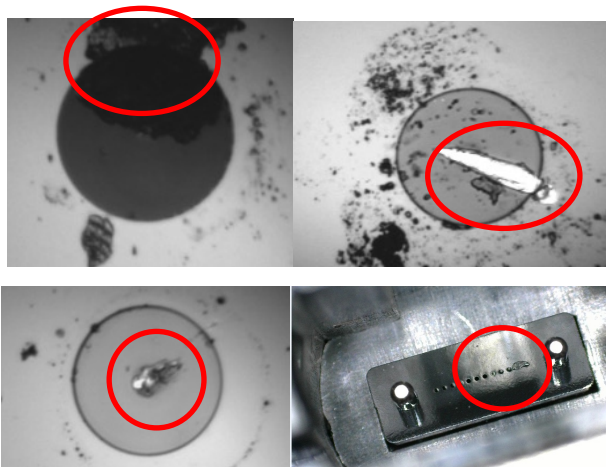




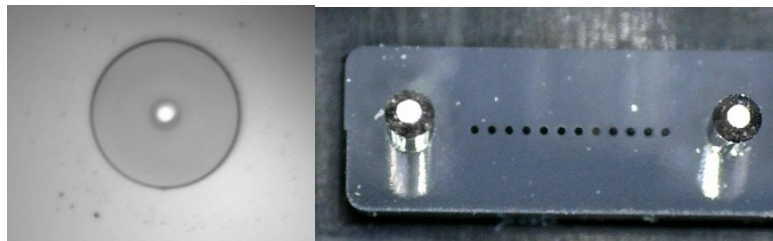
# Case 2 - Dust contaminate the optical port( part 1) H3C

**Case:** Intermittent errors or even interruptions in fiber optic connections.

**Root cause:** After on-site inspection, it was found that the situation of overhead flying network cables between buildings is very common.



Dust contaminate the optical port



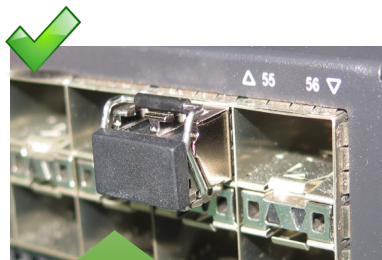
Normal optical  
(The light outlet is clearly visible and unobstructed)

# Case 2 - Dust contaminate the optical port( part 2) H3C

## Reason:

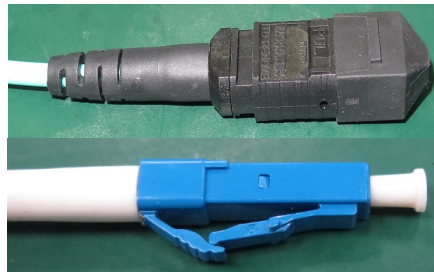
1. The optical port of the optical module is prematurely/directly exposed to the environment, and dust objects enter and

pollute;



Always keep the optical port plug before inserting the optical fiber!

2. The end face of the optical fiber connector used is not protected, and it has been polluted before inserting the optical module. After the insertion, the optical port of the optical module is polluted twice;



Do not remove the dust cap before inserting the optical module!

## Solution:

- ① Keep the IT room environment clean and free of visible contaminants;
- ② After the optical module is inserted into the switch, keep the optical port plug until the optical fiber is inserted;
- ③ The optical fiber of the equipment room wiring should keep the protective cover until the optical module is inserted;
- ④ If you need to plug and unplug the fiber multiple times, you need to pay attention to protect the fiber end face to avoid damage or sticking dust;
- ⑤ Best to clean the end face of the optical fiber with dust-free paper or a fiber end face cleaner before inserting the optical module.

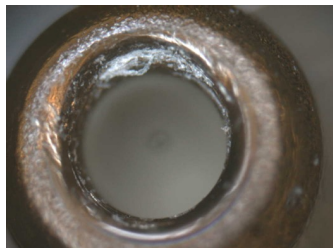
# Case 3 - Using non-standard optical fiber to damage the optical port

**Case:** The damage to the optical port results in packet loss and failure of packet forwarding.

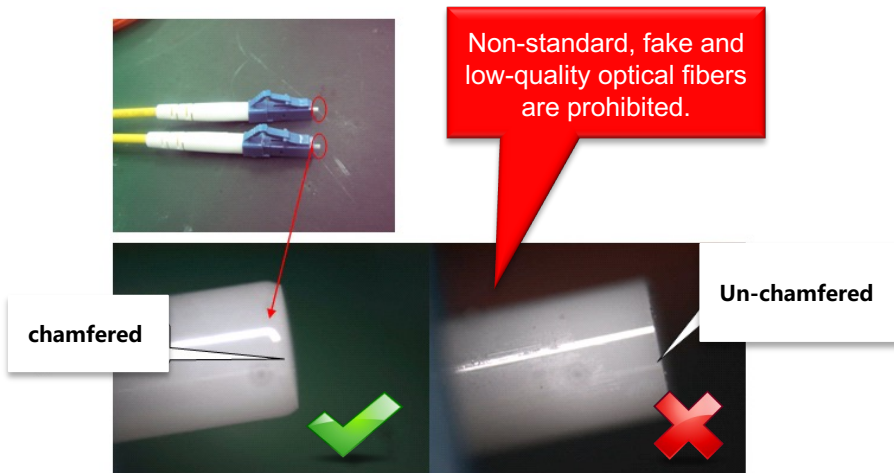
**Root cause :** After on-site inspection and positioning, it is mainly aimed at the optical fiber of the LC interface. If non-standard optical fiber is used:

- 1) It may cause damage to the components in the optical port;
- 2) Interfering and rubbing with the inner wall of the optical port during the insertion process may generate debris and cause the port to be blocked

**Solution:** Refer to the judgment method of the LC fiber standard, and use the standard fiber for networking



Schematic diagram of optical port damage



Judging whether the pins of LC optical fibers are standard

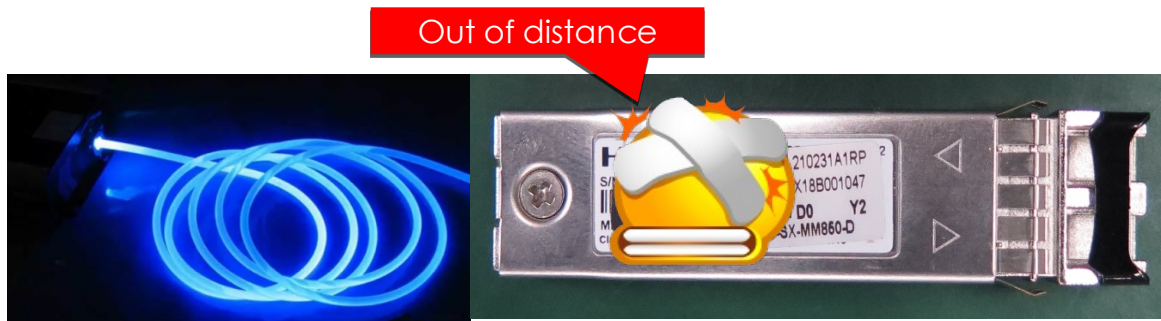
# Case 4 - The received optical power of the long-distance optical module exceeds the standard

**Case:** long-distance optical modules fail to return. After analysis, they are all caused by over-power and over-current of the APD chip at the receiving end.

**Root cause :** the received optical power is higher than the saturated optical power of the module, causing the APD chip in the receiving end to burn out. For example, the -4dbm light received by the module is higher than the -6dbm saturated optical power of the module.

## Solution :

- ① It is forbidden to insert the optical fiber without confirming the received optical power, and command to read the receiving and transmitting light range of the optical module before inserting;
- ② If possible, use an optical power meter to test that the receiving and transmitting power is in the normal receiving range, and then connect the optical module;
- ③ When using a long-distance optical module, the receiving power should be reserved more than 3dB compared with the receiving sensitivity. If it is not satisfied, an attenuator needs to be added;
- ④ Under any circumstances, the above-mentioned long-distance optical module cannot be directly tested for loopback, and an optical attenuator must be connected if necessary;



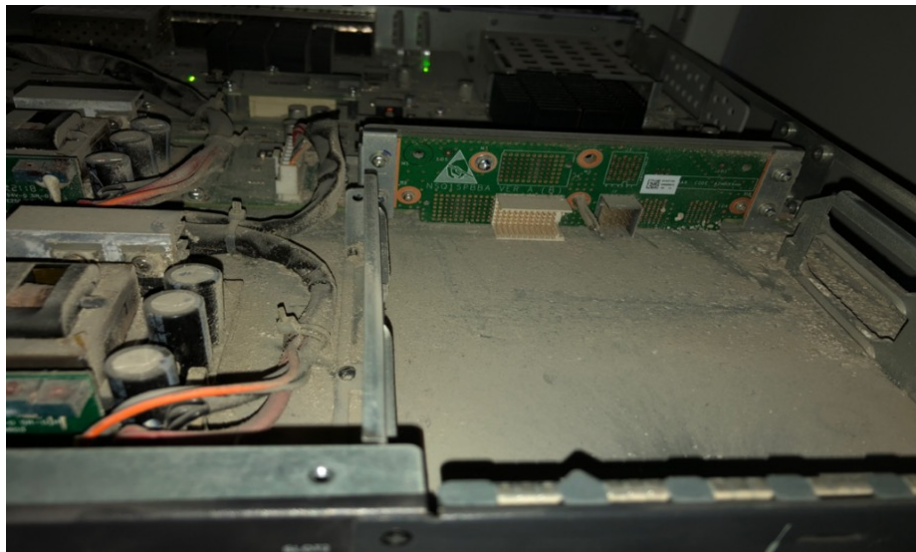
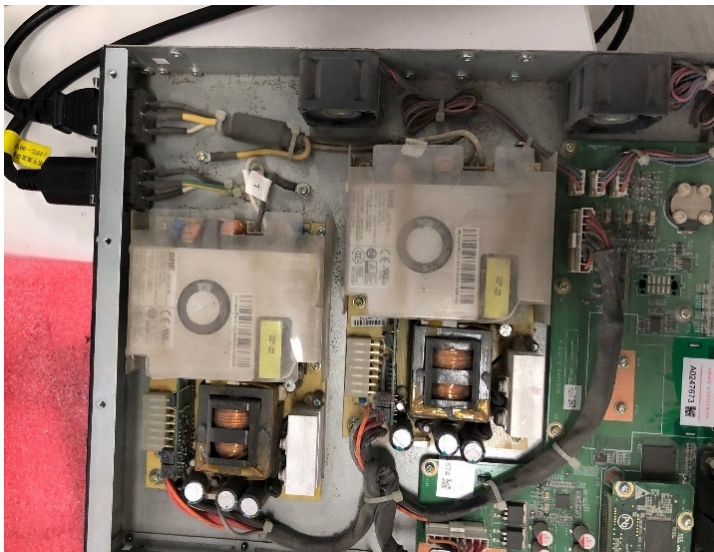
# Case 5 - Dust causes equipment abnormality

H3C

**Case :** 11 \*equipment alarms;

**Root cause :** Returning the faults parts to disassemble the equipment, it was found that there was a lot of dust inside, and some parts even appeared muddy.

**Solution :** Dust the equipment room, It is recommended to add dust filters to the equipment room cabinets to prevent possible re-contamination.





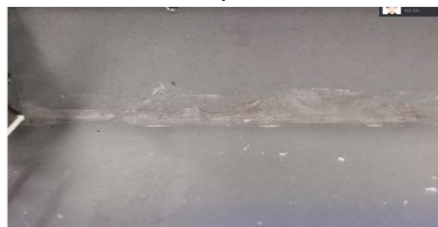
# Case 6 – Equipment damage due to water entering

H3C

**Case:** IE4300 hardware failure ;

**Root cause :** The on-site environment was hot and humid, and the disassembly found that the internal water had obviously entered, resulting in a short circuit of the main board.

**Solution :** In an environment with high humidity and condensation, it is recommended to install it horizontally to prevent condensation from flowing into the device from the DIP switch or network port.

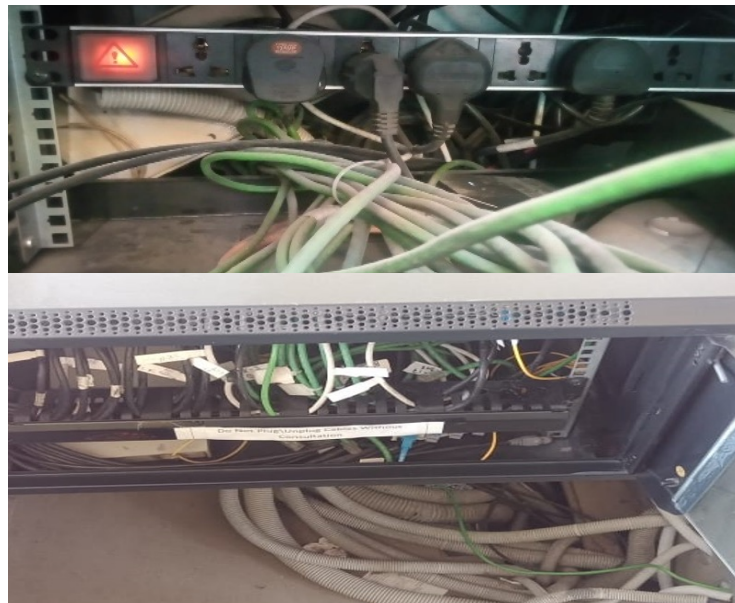
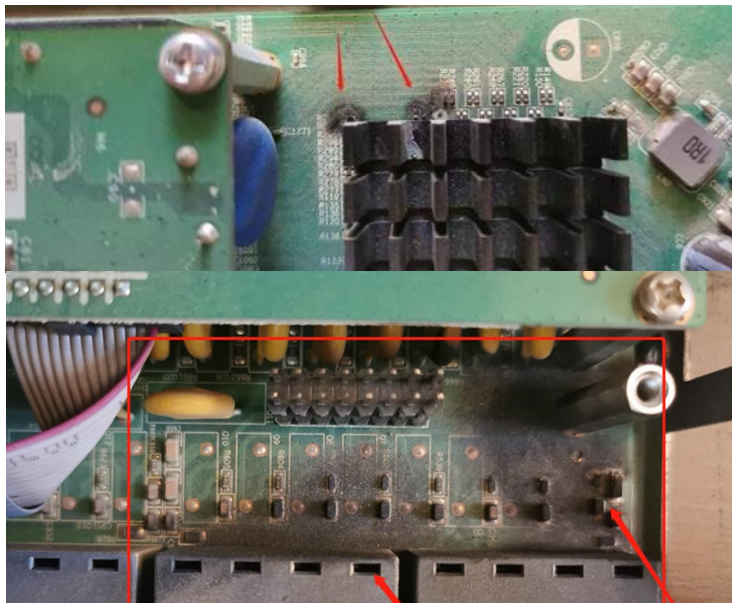


# Case 7 - S5130S-HI Internal components burned out H3C

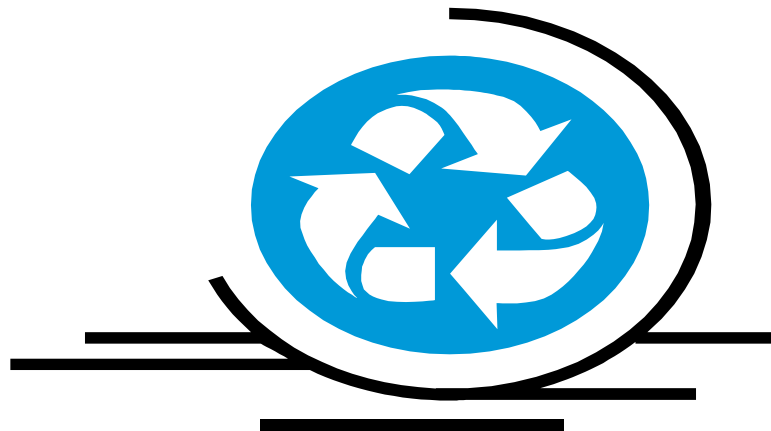
**Case:** POE fails due to the hardware is damaged.

**Root cause :** Returning the faults parts to disassemble the equipment, it was found that many components of the main control board were burned, because the high-voltage input coupled to the network port broke down the components.

**Solution :** On-site highway toll station S5130S-HI has mixed wiring of strong and weak current, no grounding, and a lot of dust. It is recommended to separate the strong and weak points (with an interval of more than 30cm), standardize the grounding, and install a dust-proof net.

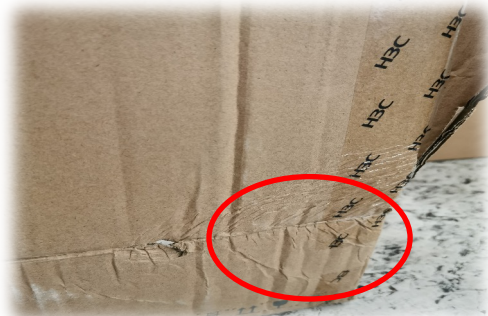


## ■ Part-2



## Things to pay attention to when signing!

**Outer box squeeze deformation**



**Torn outer box**



**Hole in the outer box**



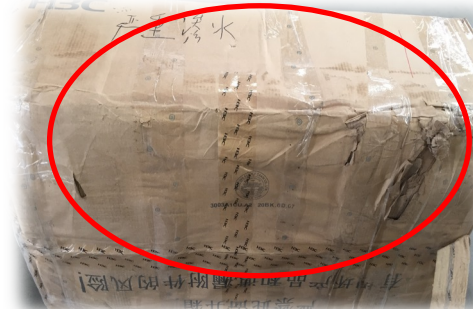
**Secondary treatment of damaged outer box**



**Wet outer box**



**Water seepage from the outer box**





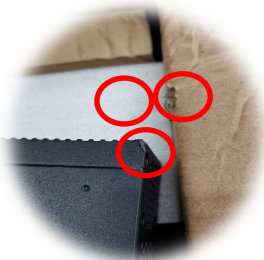


## Case Sharing

### Sign the damaged packaging products , Abnormalities found after unpacking

**Background** : A customer received an S5560 device, and no abnormality was reported when signing for it. After unpacking, it was found that the chassis was deformed.

**Investigation process** : According to the equipment pictures and other information provided on the spot, it was found that the bumps at the end corners of the switch, the penetration of the packaging material and the penetration hole outside the carton had an obvious corresponding relationship, and it was finally determined to be the logistics and transportation damage.



**Summary:**When receiving the goods, you need to carefully check whether the model of the order matches / whether the quantity is correct / whether the appearance of the package is damaged. **If you find an abnormality, please stop signing for it immediately, keep the original packaging and take a photo on the spot, make sure to note the abnormal information on the receipt, and contact the overseas service hotline.**



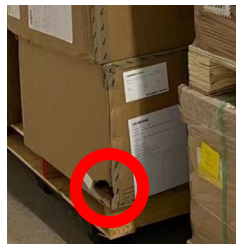


## Case Sharing

### No abnormal noted when signed of overseas project , difficult to hold accountable afterwards

**Background** : An Internet customer delivered 50 boxes of equipment overseas, and no abnormality was reported when signing for it. During the inventory, it was found that the carton was damaged and the chassis was deformed.

**On-site feedback** : On the afternoon of Friday, September 17, the logistics carrier delivered the goods, and the customer signed for it normally, and did not note any abnormalities on the receipt. On Monday, September 20th, our service staff found that part of the carton was damaged when carrying out equipment handling and checking the number of boxes as agreed. After unpacking and inspection, it was found that the chassis of an H12504 equipment was deformed.

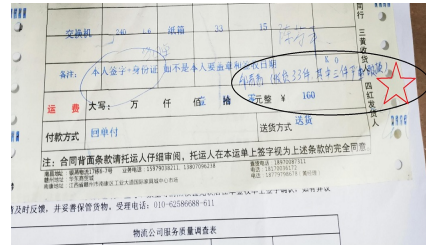


**Summary:** Promote the signing process. Overseas projects need to be signed strictly and cleanly, and the interface with the carrier must be clear. All defective problems will be noted on the receipt. If the damage is serious, you can open the box and inspect the goods in person. Once the receipt is normally signed, the cost of subsequent communication with the carrier is extremely high and affects the customer's construction period.

## Take photos during the signing process, and note the damage to the receipt

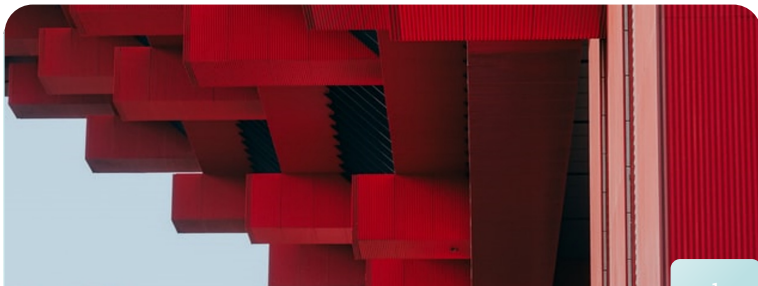
**Background :** 33 boxes of equipment for a project, found abnormal when signing for receipt, immediately took photos and contacted TS, TS reported back to the customer quality department, and found that the cartons were damaged and deformed after the inventory.

**On-site feedback :** The agent received the goods at noon on September 26 and found that 3 of the goods were damaged in the outer box. They immediately contacted the representative office TS. TS immediately contacted the customer quality department on WeChat, considering the urgent needs of the customer, sign the receipt and note the damage, and record the damaged photos , If the subsequent unpacking is found to be damaged in transportation, you can make a claim to the general agent based on the receipt.



**Summary : The signed receipt is the proof of whether the handover between the two parties is intact. Please check it and cleanly handed over. Subsequent issues are not disputed, and the processing time will be very fast.**

## Things to pay attention to when unpacking!



### Avoid centralized unpacking

Centralized unpacking can easily lead to missing accessories, It was discovered when the box was cleaned and install the device, which delayed the construction period



### Avoid unpacking upside down

Unpacking the box upside down is prone to loss of attached accessories (incorrectly lost by the packaging material cover up ), and there is a risk of damage to the equipment

**Instruction book for unpacking and inspection of CT products , [http://ibpm.h3c.com/bpm/r?wf\\_num=h3c33N004](http://ibpm.h3c.com/bpm/r?wf_num=h3c33N004)**

- ✓ First check whether the outer packaging is damaged. If there is damage, take pictures in advance and contact the H3C interface person on the receipt. When opening the box, do not damage the surface of the device with tools. First check the attached accessories (such as power cords and mounting brackets) according to the list. Pay attention that the mounting brackets are easily lost when they are stacked; then check the appearance of the device. If it is a single board, check whether the connector is damaged, curved needles and so on.



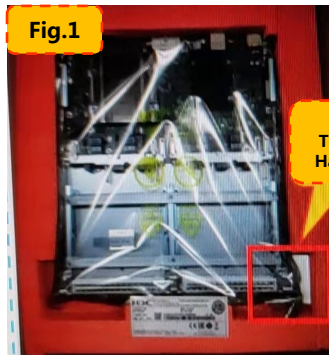
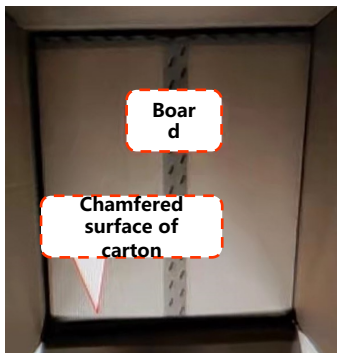
## Case Sharing

### Unpacked carefully, the device is hidden

**Background:** Problem feedback: The on-site engineer of a bank project in Heilongjiang reported that when the RT-FIP-660 interface card was unpacked and installed, it was found that there were only empty sheet metal parts and no actual circuit board.

**Investigation process:**

The packaging of this product is quite special. There are 2 cartons stacked up and down in the carton, the upper carton is filled with boards, and the lower carton is equipped with a windshield fake panel. The carton was not found.



**Summary :** During the unpacking process, it is necessary to carefully check whether there are other equipment in the carton, and do a good job of on-site investigation.



### Centralized unpacking of devices, make a mess

**Background:** A hospital customer reported that when unpacking and inspecting the server equipment, it was found that 4 HBA cards were missing and the packaging materials had been sold as scrap.

**Investigation process:**

1. The customer's project has ordered more than a dozen R6900 servers, and each host has a different configuration and number of accessories;
2. The customer unpacked the package on site, mixed the HBA cards and optical modules included in the server, and found that the optical modules under the 4 HBA cards were missing;
3. The Market Interface Department investigated the shipment collection records of all hosts, HBA cards, and optical modules, and confirmed that there are no abnormalities;
4. Later, the customer was asked to actively cooperate with the on-site search. The next day, the customer reported that the lost optical module was recovered at the site.

**Summary:**

**On-site unpacking personnel should standardize the inspection:** 1) It must be done to unpack one and count the one and record the one; 2) Avoid centralized unpacking and pile up all equipment to count the quantity. This method is likely to cause omission/lost situation;

**During the on-site unpacking process, the evidence must be kept:** the customer and the service party must be present at the same time. It is recommended to unpack and inspect the goods one by one in a monitored environment (retention proof). Keep the original packaging and do not discard it before confirming the quantity.





## Case Sharing

### Devices water inlet, Misjudgment on site

**Background:** An Internet project integrator reported that when the S9825 device was unpacked and inspected, it was found that there were a lot of water drops between the device and the anti-static plastic bag, but the packaging material was dry without any trace of water or moisture.

**Investigation process:**

1. The customer ordered 14 sets of S9825 device, only this one had the problem, and all the records before leaving the factory are all normal
2. After the device and packaging materials are returned, the actual conditions are inconsistent with the information reported by the previous integrator: the equipment was unpacking upside down, there is a pool of water marks on the inside, water pours in from directly above the device package. There are obvious signs of soaking
3. After investigation, it was confirmed that it was the logistics route in Zhengzhou when Zhengzhou was flooded, and the outer box of the device was flooded. But the outer box had been air-dried, and no obvious wet damage was found in the delivery link.

**Summary:**

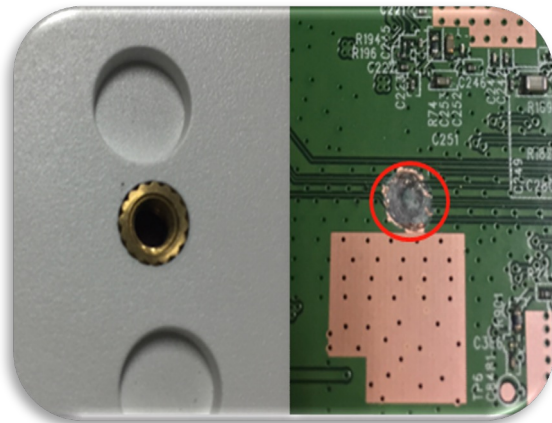
**On-site unpacking personnel should be standardized for inspection:** avoid unpacking upside down

**Problem equipment packaging materials need to be carefully inspected:** most of the water vapor in the equipment enters through the packaging materials, and the packaging materials need to be carefully checked for signs of water ingress or soaking. At the same time, keep first-hand information for on-site video and photographs, and keep the original packaging. Discard it and cooperate with the customer quality management department for related processing.

## Attention during installation!

### Scenario 1: The wrong screws are used when racking on

Impact: internal parts fall off, PCB damage



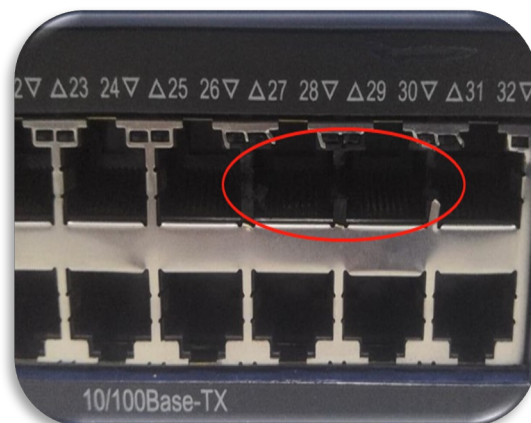
### Scenario 2: The board bumps after unboxing

Impact: Deformation of the linker needle (back needle)



### Scenario 3: Unstandardized plugging and unplugging of network cables

Impact: The network port connector is damaged



**Material damage caused by improper operation cannot be replaced free of charge.  
Please contact the local service hotline for paid maintenance**



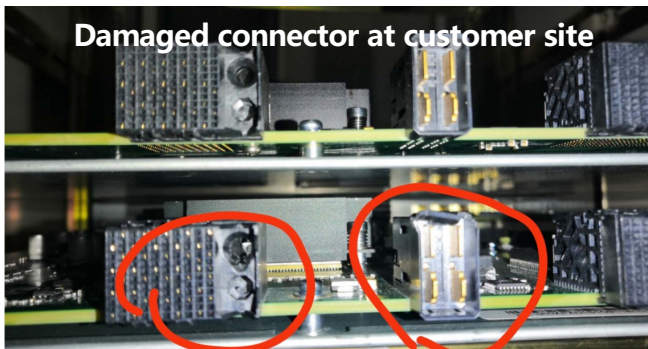
## Case Sharing

### On site unpacking with insufficient protection leads to deformed pins

**Background:** During the installation of the chassis, the pins of the board were deformed. This was confirmed on the spot during installation, and it was confirmed on the spot that the pins of this board were deformed.

#### Investigation process:

According to the pictures provided on site, both the power connector and the data connector are damaged. It is confirmed that the connector picture is intact through the monitoring before leaving the factory, and it is judged that the damage is not a factory problem, but damaged after unpacking.



**Summary:** Bare board transfer/stacking is prohibited after unpacking on site. If there are special circumstances, please be sure to take care; before inserting the chassis, be sure to check the appearance of the connector again to avoid chassis damage.



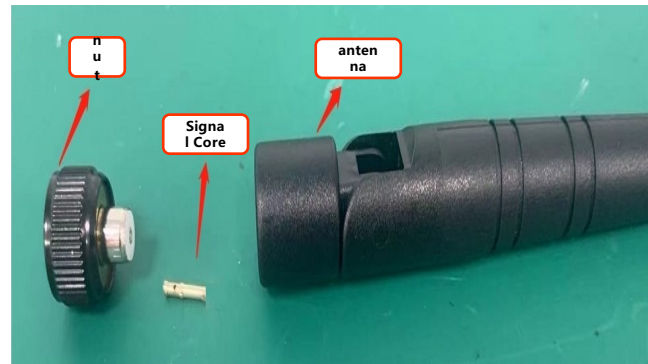
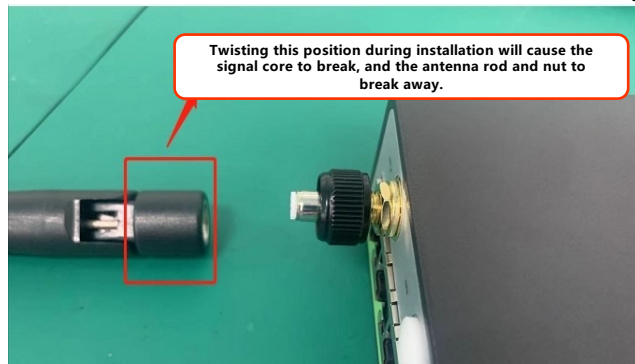
## Case Sharing

### Broken antenna due to excessive force when installing

**Background:** A customer of a distribution project reported that an MSR810 antenna was broken when unpacking.

**Investigation process:**

According to the pictures provided on site, it is analyzed that the antenna is screwed when the customer is installing on site, and the antenna is continued to be screwed when the antenna nut is not rotating. The signal core connecting the antenna nut and the antenna rod is broken by force, causing the antenna nut and the antenna rod to break away.



**Summary:** Improperly installed antennas on site may damage the antennas. Please refer to the "Installation Guide" for the installation of the MSR810 antenna: screw the antenna clockwise to the antenna port of the router, and be careful not to apply excessive force to avoid damage to the antenna.

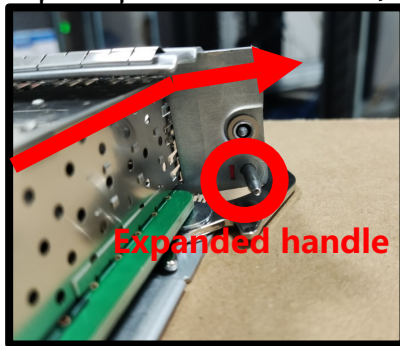


### Board damage due to mismatch

**Background:** A school in Shaanxi reported that an S7503E master controller could not be inserted into the chassis, and the handle bar was deformed.

**Investigation process:**

After investigation, it was found that the board in question was the S7503E master controller, and the product was designed with positioning pins. The chassis used by the customer on site is the S7506X. This product does not have positioning holes. The two are not compatible and cannot be mixed. Looking at the picture of the board, the handle is slightly expanded, but the outer box is intact. It is judged that the customer is deformed by force after improper operation after unpacking on site. .



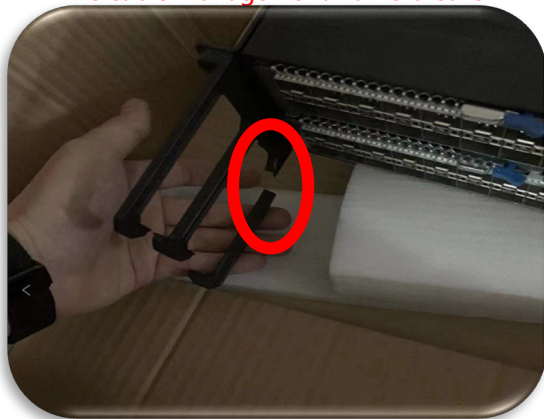
**Summary:** Similar models of equipment in the contract order should be put on the shelves with special attention to avoid equipment damage caused by human error.



## Attention during installation! !

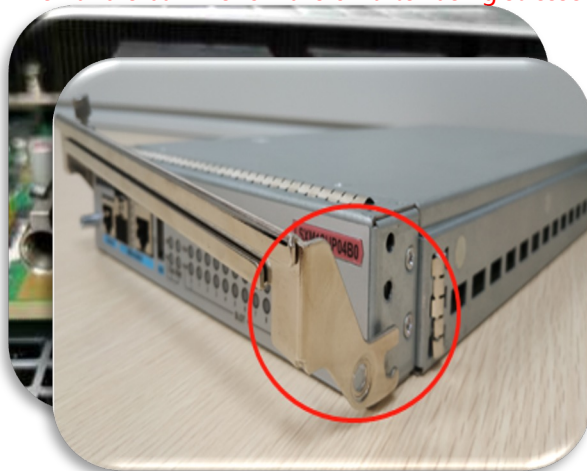
### Scenario 4: Wrongly use the cable management frame as a handle

The cable management frame breaks



### Scene 5: Wrongly use the handle bar as a handle

The handle bar wrench falls off after being stressed



### Scenario 6: Irregular installation of slide rails

Excessive pulling of shrapnel causes permanent deformation

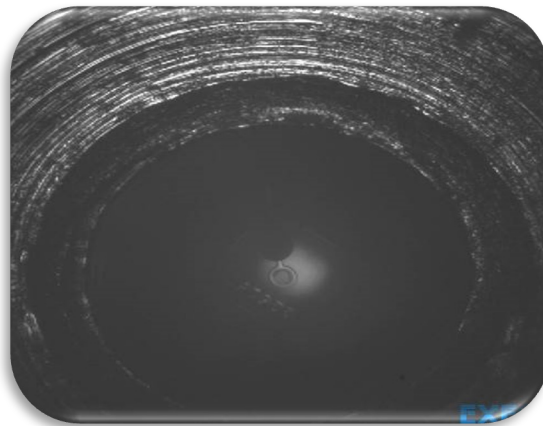


**Material damage caused by improper operation cannot be replaced free of charge. Please contact the local service hotline for paid maintenance**

## Attention during installation! !

**Scenario 7: The interface indicator is off due to the dirty optical module**

Return the normal optical module by mistake



**The storage environment of the optical module should be clean and dry, and the interface of the optical module should be kept clean when installing on the rack.**



## Case Sharing

### The SSD hard disk installed on site is not fixed

**Background:** On-site technicians of a project in Hong Kong reported that the SSD hard disk was loose when the F1000 security product was installed with the SSD hard disk. The feedback video clearly shows that the hard disk PCB board can slide back and forth in the hard disk slot.

**Investigation process:**

This type of SSD hard drive is semi-finished at the factory and needs to be assembled on site. According to the video feedback on site, it was found that the screws fixing the hard disk PCB board were not installed, which caused the hard disk PCB board to loosen, and the on-site personnel slide the PCB board back and forth, which may cause damage to the device.



Screw is not fixed



**Summary:** Please refer to the H3C product installation manual before installing unfamiliar products. If it is not covered in the manual, please contact the local service in time. Do not dispose of it by yourself to prevent man-made damage. Please accumulate experience and organize learning regularly.



## Case Sharing

### The plastic part of the smart mounting brackets are broken

**Background:** A project of Aishu OEM server reported that a R4300G3 server mounting bracket was damaged while unpacking.

**Investigation process:**

After inspection, when the equipment was packaged in the factory, the monitoring showed that the mounting ears were intact. According to the photos provided by the customer on site, it is determined that the cause of the failure is that the customer grabs the smart mounting ear to lift the server when moving the server, which causes the plastic part of the smart mounting ear to fall off.



**Summary:** The mounting ears for devices such as servers and storage are not load-bearing. Please use the lift on the side of the chassis to carry the device.



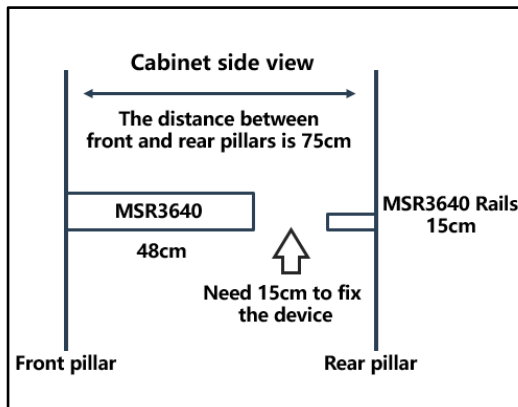
## Case Sharing

### The site survey is not perfect and the devices cannot be installed on the rack

**Background:** The MSR3640 routers at multiple overseas offices of an Internet company are equipped with standard slide rails, which cannot be matched with the on-site cabinets.

**Investigation process:**

The standard sliding rail in the "MSR3600 Router Installation Guide" requires a range of 310mm to 440mm between the front and rear pillars of the cabinet, and special sliding rails are required if the distance exceeds this range. The front and rear pillars of the on-site cabinet are 750mm, so the standard slide rails cannot be installed on the rack. It is determined as a site survey problem.



- **Depth**—A minimum of 680 mm (26.77 in)
  - **Distance from the front post to the front door**—A minimum of 80 mm (3.15 in)
  - **Distance from the front post to the rear door**—A minimum of 550 mm (21.65 in)
  - **Distance from the front post to the rear post**
    - 310 mm (12.20 in) to 440 mm (17.32 in)  
Allow a minimum of 160 mm (6.30 in) distance from the rear post to the rear door.
    - 465 mm (18.31 in) to 595 mm (23.43 in)
- (As a best practice, use a rack shelf to mount the router in a rack.)

**Communication:** What are the procedures for overseas project surveys? Solutions to site survey problems?



# Thanks

— [www.h3c.com](http://www.h3c.com) —