Best Practices for Maintenance of the Cisco ASR 903 Router

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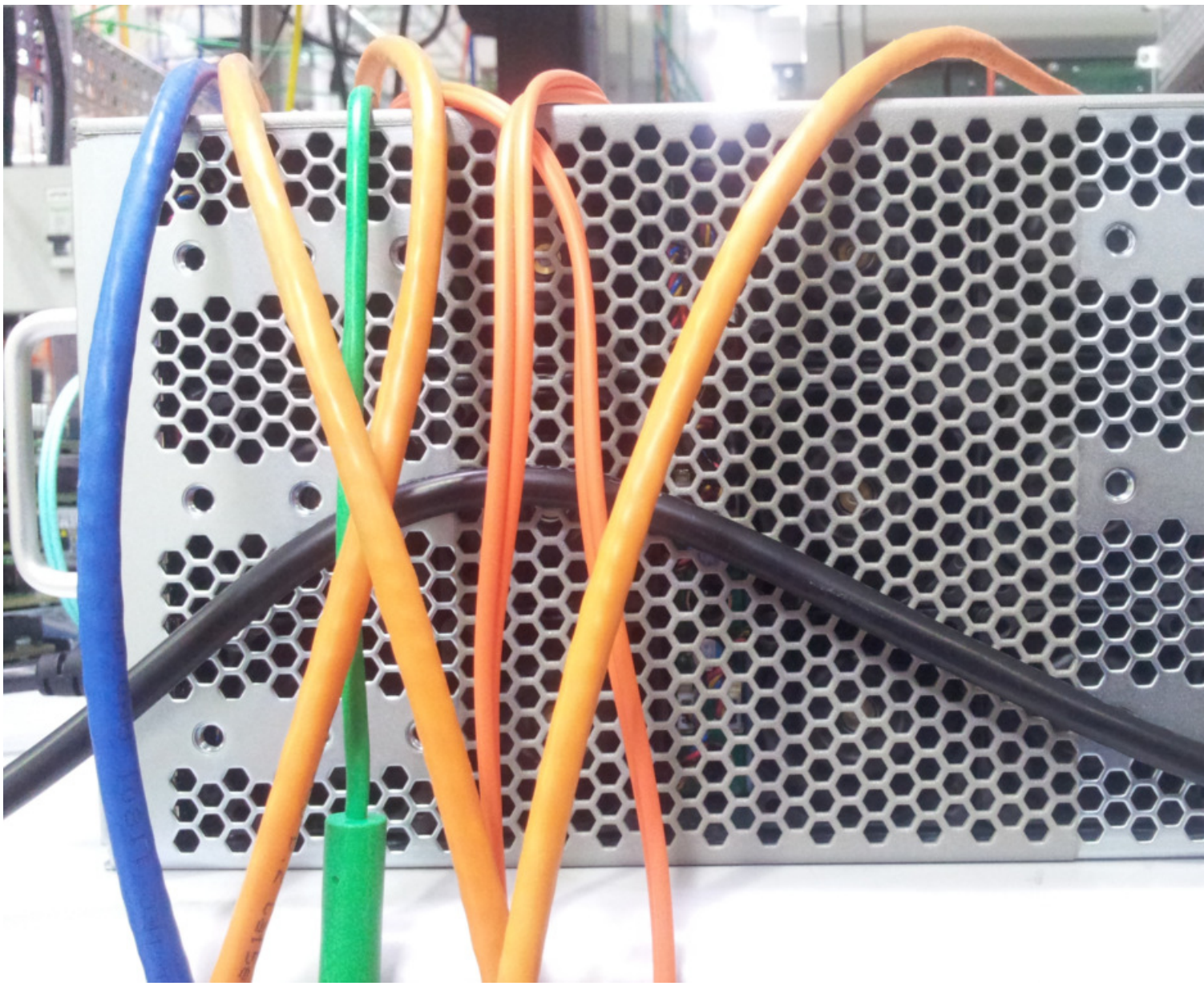
Router Management Best Practices

This document describes the best practices to be followed during installation & maintenance of the Cisco ASR 903 Router. These best practices help to improve the product reliability by minimizing the risk of failure, improving Mean Time between Failures (MTBF) and reducing the maintenance costs.

Cabling

Ensure that the cables do not obstruct the air-inlet and the air-exhaust grid of router. Obstructing cables lead to improper ventilation that causes overheating of the equipment, as well as accumulation of dust to in the router.

Figure 1: Obstructing Cables



Best Practices While Using Copper Cables

The following guidelines are recommended during the installation of copper cables:

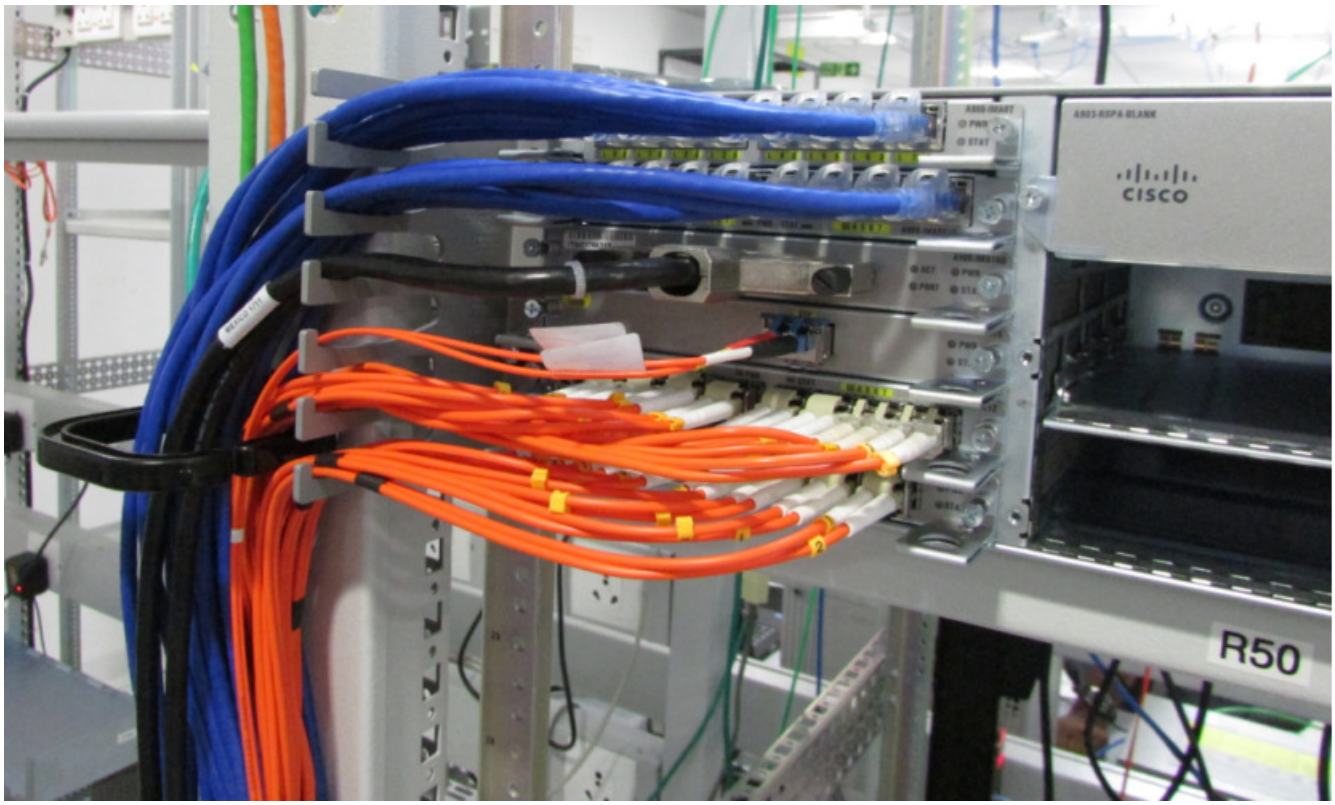
- Avoid placing multiple cable bundles over each other.
- Avoid bundling together a large number of cables.
- Ensure that the copper cables are twisted together. This helps to cancel out Electromagnetic Interference (EMI) from the external sources.
- Use the velcro-based ties every one-to-two meters to bundle or secure cables. Avoid using zip ties as they apply pressure on the cables.
- Avoid the following actions that can stress the cable:
    - Applying extra twists to the copper cables
    - Pulling or stretching beyond the specified pulling load rate.
    - Creating tension in the suspension runs.
    - Stapling or applying pressure with the cable ties.

Best Practices While Using Fiber Cables

- Avoid the following actions that can stress the cable:
    - Pulling or stretching beyond the specified pulling load rate.
    - Bending it beyond the specified bend radius.
    - Creating tension in the suspension runs.
- Do not touch the fiber tips of fiber cables.
- Use single mode or multi-mode optical fiber cables according to the optical transceiver requirement.
- Use fiber cleaner to clean the fiber tip as well as the transceiver before inserting the fiber cable into the optical transceiver.

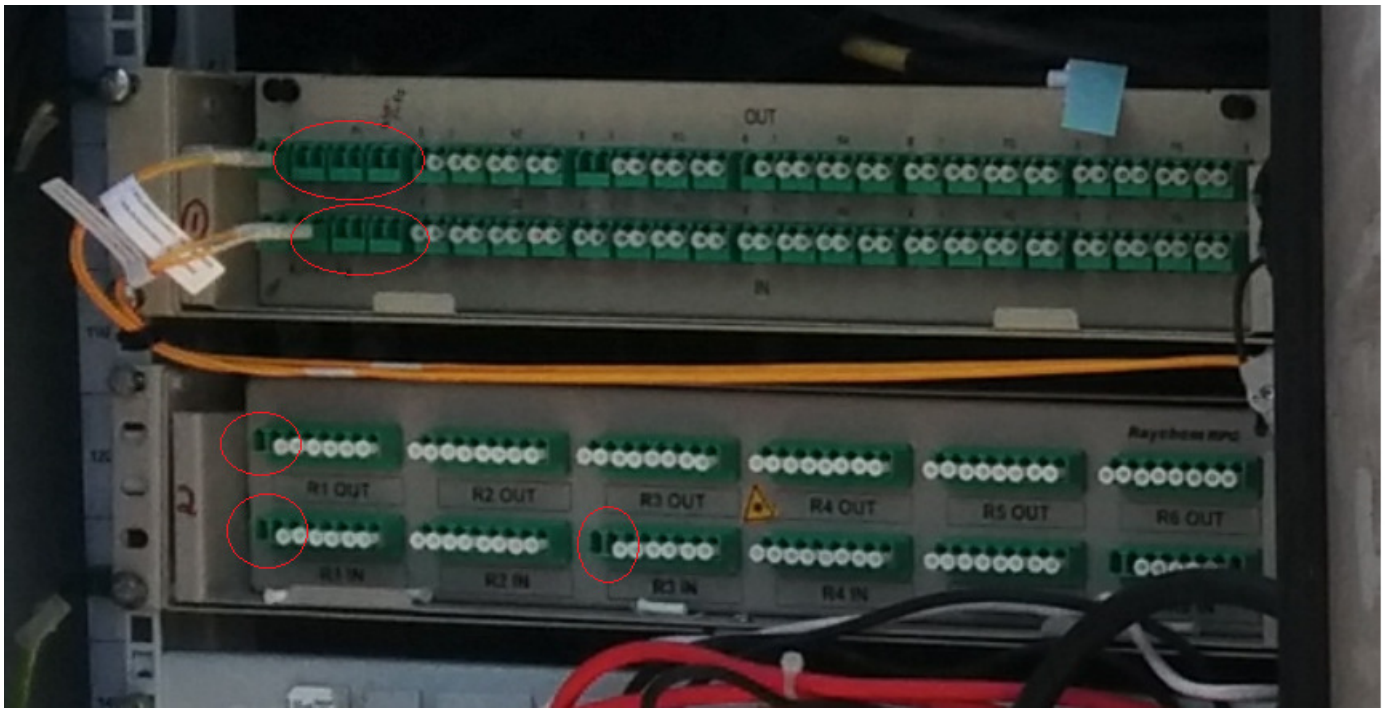
- To avoid excessive bending and resulting damage of fiber cable and efficient routing of cables, it is recommended to use cable guides or cable brackets as shown in figure below.

Figure 2: Using Cable Management Brackets



- If fiber panels are used, do not leave unused fiber port open as shown in figure below. Instead, use a protective cap to fill an unused fiber port. Dusty fiber ports can cause unwanted link failure over a period of time. Such ports must be cleaned thoroughly using a fiber cleaner before inserting fiber cable.

Figure 3: Used Fiber Ports Must Be Covered



Best Practices While Using Copper and Fiber Cables

The following guidelines are recommended whe you are using both, copper and fiber cables:

- Separate the copper and fiber cables in the runs (or have separate runs) because the weight of the copper cables can crush the fiber cables that are placed below the copper cables
- Test every cable during installation and termination. If a problem occurs, tag the malfunctioning cables and separate them out.
- Remove the abandoned malfunctioning cables, as they restrict the airflow and contribute to the increase in the operational temperatures.
- If there are cables running in or out of a sealed outdoor cabinet, ensure that all the cable glands are sealed to prevent dust and moisture from entering the box.
- Do not use copper and fiber cables whose connector retention tabs are broken.
- While inserting copper and fiber cables into interface module ports, check that the connector retention tab locks into the connector or the optical transceiver properly.

- Close unused or unconnected ports using protective caps. This is applicable to IMs, RSPs, and fan tray.

Figure 4: Closing Unused Ports with Protective Dust Caps

Note Dust caps are separately orderable from Cisco and are available for variety of input/output connectors.

Electrostatic Discharge

Electrostatic Discharge (ESD) refers to the transfer of electrostatic charge between bodies at varied voltages that is caused by direct contact or induced by an electrostatic field. ESD can damage or destroy an equipment.

Best Practices for ESD Protection

To prevent ESD, damage, use the following devices while installing the router or any other networking equipment:

- Antistatic wrist strap—Attach one end of the wrist strap to an earth ground, that is, the ground pin of the chassis, and wrap the other end around your wrist. The wrist strap is connected to the ground through a coiled retractable cable and allows high-voltage charges to leak through and protects the equipment from ESD.
- Antistatic bags—Always use antistatic bags whenever storing or shipping network equipment. Antistatic bags keep stray dust charges away from the equipment and protect them from ESD.

System Airflow

Proper airflow through the data networking equipment helps maintain effective operating temperatures and prevents premature end of the equipment life. Improper airflow due to obstacles at air-inlet or limited space between the chassis air vents and the adjacent walls lead to equipment overheating. The use of incorrect cabinets prevents proper airflow and ventilation. For more information on the airflow guidelines, see the *Preparing for Installation* chapter in the Cisco ASR 903 Aggregation Services Router Hardware Installation Guide.

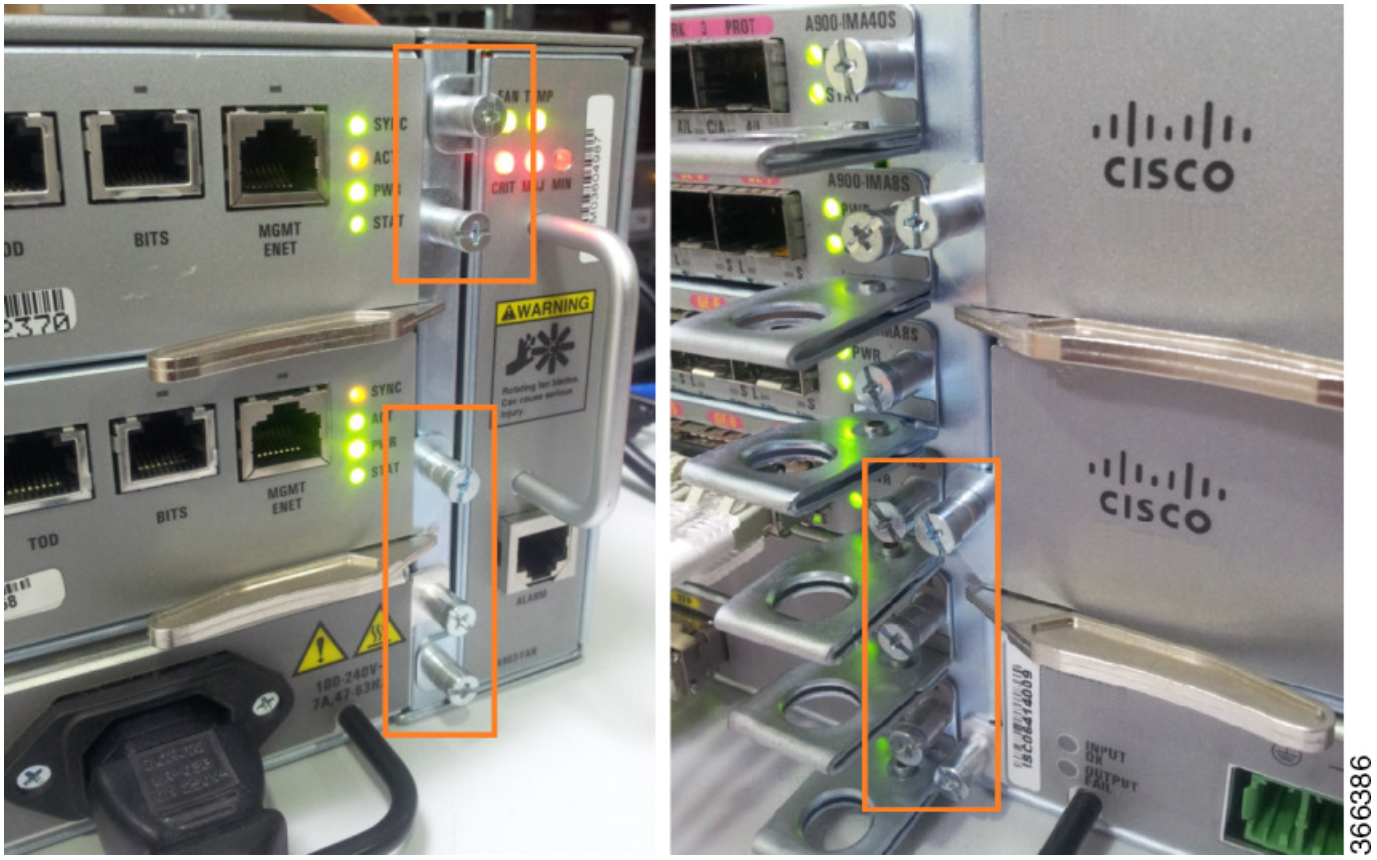
Mechanical Assembly and Power Redundancy

Any missing or loose screws either on the router/rack combination, or on the interface modules (IMs), RSPs, power supplies, and fan tray can lead to major safety issues. For example, a heavy chassis may drop or a malfunction may occur due to imperfect connectivity with the backplane.

Follow these guidelines during installation or replacement of any component in the router:

- Check the backplane connectors inside the router and on the board (IM, power supplies, fan tray, and RSPs) before inserting them in the router. Ensure that there is no deformation or bent pins on the male/female backplane connector parts.
- Properly tighten the captive screws after the board is inserted into the router.

Figure 5: Tighten All Captive Screws



- This Cisco ASR 903 router provides power redundancy. To accommodate zero downtime of the router, ensure that system has both the power supplies installed. Also ensure that both power feeds are connected and live under required operating voltage range.

- When installing the router either in horizontal or vertical position, ensure that the router is secured to the rack with at least two screws on each side.

Figure 6: Securing the Router with Screws

Blank Fillers

To ensure the proper airflow and heat dissipation in the router, it is essential to protect unused slots by using blank faceplates. As a mandatory requirement, ensure that unused front slots of router are covered with blank fillers and secured properly with the captive screws. The fillers prevent accumulation of dust into the router and abnormal rise of board temperature.

Figure 7: Empty Slots Must be Filled with Blank Fillers

Optical Connectors and Ports

When optical connectors and ports are not protected by using the appropriate protective caps, it leads to the following:

- Improper functioning of the ports.
- Board failures due to the presence of dust on the boards.
- Poor cable connectivity due to dust accumulation in the port.

Best Practices for Using Optical Connectors and Ports

Never leave the optical connectors open and without protective caps. Unprotected optical connectors gather dust and can be damaged. Damaged connectors result in transmission errors

Dust Filters and Fan Tray

Always base your maintenance decisions on the environment in which the router resides. Depending on the environment, equipment may require either more or less frequent attention.

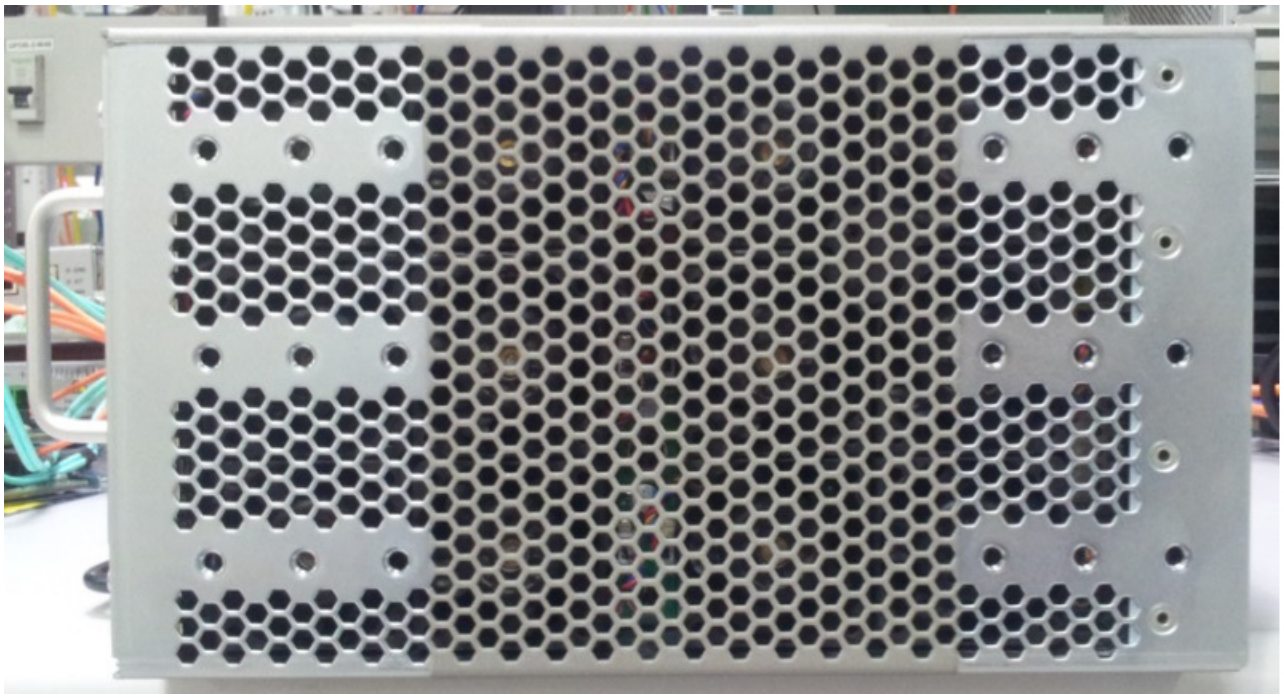
Best Practices for the Dust Filter and Fan Tray

Note Dust filter is a single-use component.

- A periodic health check of the filter, every three months based on the level of dust in the environment, helps in avoiding over clogging of the filters and provides a better life. If the router is installed in a controlled environment, check and replace the filter every three months, otherwise replace the filter every month.
- Do not vacuum the air filter while it is being installed. Before you clean it, completely remove the air filter to prevent contaminants from being drawn into the equipment, and then clean it outside the data center.
- Do not wash the filter and then install it in the system. Moisture can get drawn into the system and attract more dust that can accelerate the effects of corrosion.

- Periodically clean the air inlet and air exhaust on the sides of the router. Follow the same guidelines to clear the air grids as mentioned in thein the points above.

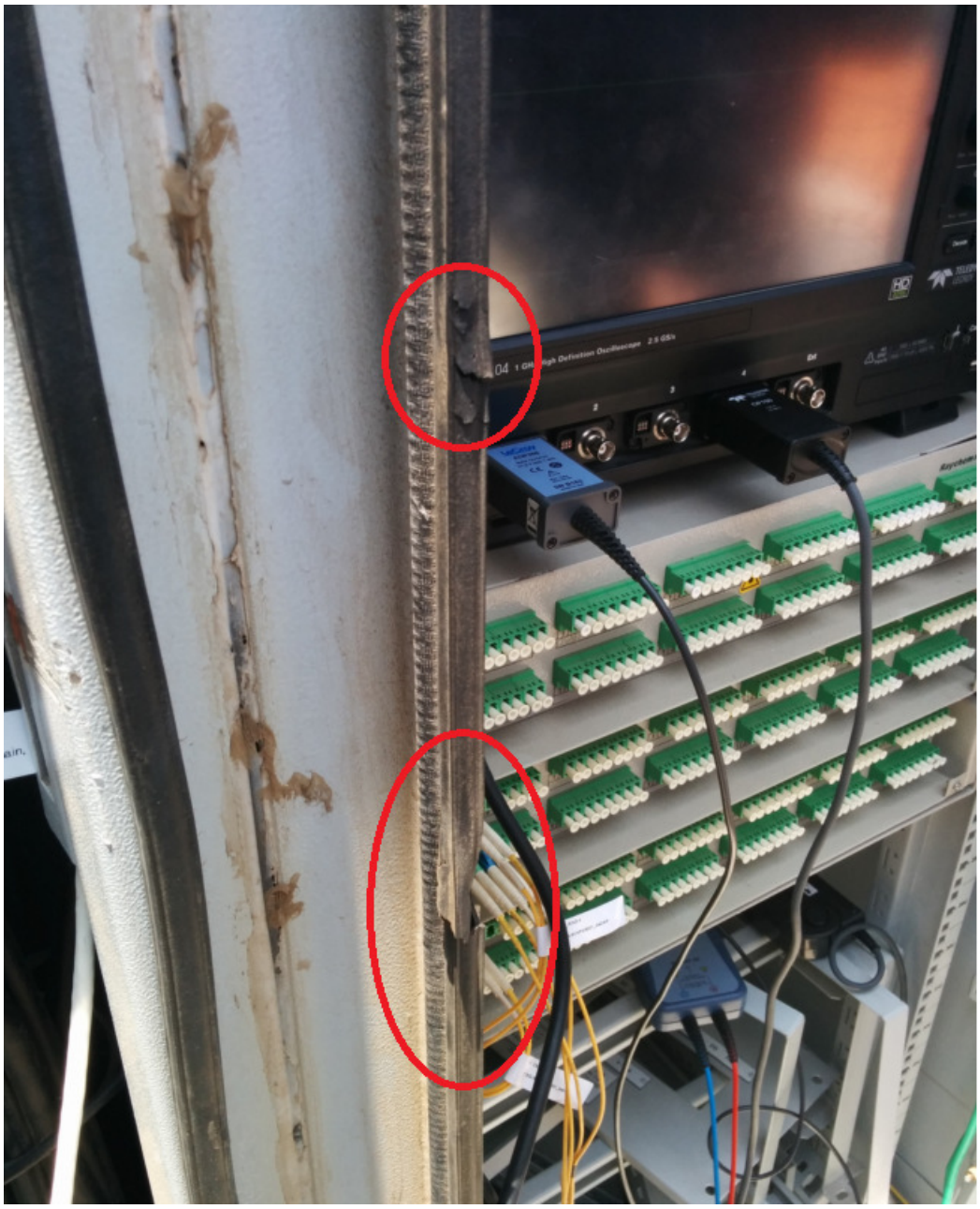
Figure 8: Inlet Grids of the Router



- For information on fan tray replacement, see the *Removing and Replacing the Fan Tray* section in the Cisco ASR 903 Aggregation Services Router Hardware Installation Guide.

- If the router is installed in an outdoor cabinet (IP65), ensure that the cabinet gaskets are healthy and do not have any wear and tear. Defective gaskets can allow excessive moisture and dust into the cabinet that can harm the equipment.

Figure 9: Torn Gaskets



Packaging Material

Cartons and packaging material, such as wooden pallets and fiberboard must not be permitted in the installation site. These packaging material are a dust hazard. They can be airborne and get carried into the network equipment air intake vents. Dust is especially damaging when impregnated with moisture in damp conditions.

Figure 10: Packaging Material

Best Practices for Packing and Packaging Material

- Do not carry the router in any other packaging material except Cisco-provided packaging. Using other inferior packaging for equipment movement causes severe damage to the product
- If the equipment is opened for testing purposes and then re-packaged again for movement, package it in the same way as it was packaged at the time of product delivery. Incorrect orientation (horizontal or vertical) may damage the product during transportation.
- If the faulty hardware is to be shipped to the RMA depot, use the same Cisco packaging that was provided at the time of the product delivery.
- Always use ESD cover to wrap the hardware before packing it into the packaging carton.

Best Practices for Handling Dust

To avoid accumulation of dust and particulates on the inner parts of router, it is important periodically clean the inner components of the router during downtime or regular maintenance windows. Clean the dusty equipment as follows:

- Do not touch the equipment and keep a minimum distance of 12 inches (about 30 cm) to prevent ESD damage. Always wear a wrist strap. In case of outdoors where the ESD wrist strap cannot be plugged, do not touch any sensitive component.
- Do not use a brush to clean the hardware. Use an air duster or air blower instead, keeping it at a minimum distance of 12 inches (about 30 cm) to prevent potential ESD damage.
- When blowing the equipment with air, ensure that you do not to push the dust under the electronic components (resistors and capacitors). Also, ensure that the air pressure is not so high as to damage the electronic components.
- Perform air blowing outside the installation site, possibly in the open air or in a place where the dust that is blown away does not create any harm or re-enter the installation facility.

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