

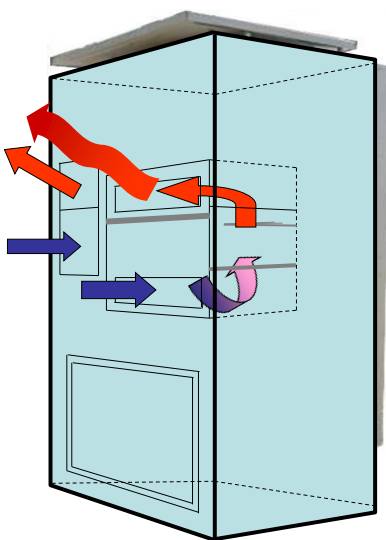
Aftermarket Upgrade Kits for OSP (Outside Plant) Fresh Air Cooled Telecom Cabinets

Purpose:

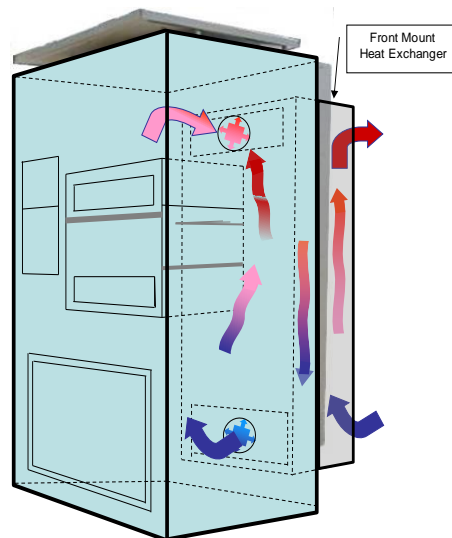
Reduces nuisance alarms and premature failures of Base Station Components while preserving optimum thermal performance

The Designs:

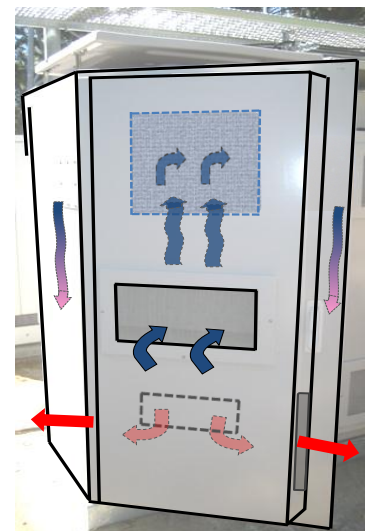
Typically, Base Station Cabinets feature a circuit to cool the RF power amplifiers and a 2nd circuit utilizing a front mount heat exchanger or fresh air filter system to directly cool the cabinet electronics.



RF Power Amplifier Cooling Circuit



Front Mount Heat Exchanger



Fresh Air Filter Cabinet

The Problems:

Both cooling circuits rely on thermal transfer that is compromised by the accumulation of dust, grime, oils, organic material and various insect contaminations on the heat transfer surfaces. The photos below show examples of typical build-up that occurs within a short time of deployment in the field. The result of this accumulation is higher internal temperatures which in turn compromise the life of the amplifiers and electronics and leads to nuisance alarms and premature failures.



Typically, the fresh air cooling equipped cabinets are not designed for easy access to or replacement of filters to effuse the outside air. Over time, these filters can become friable and clog or rupture. Typically, the maintenance procedure to replace the filter requires 1-2 hours to disassemble the front door of the cabinet; so preventive maintenance is not practical or recommended by the OEM.

The Solutions:

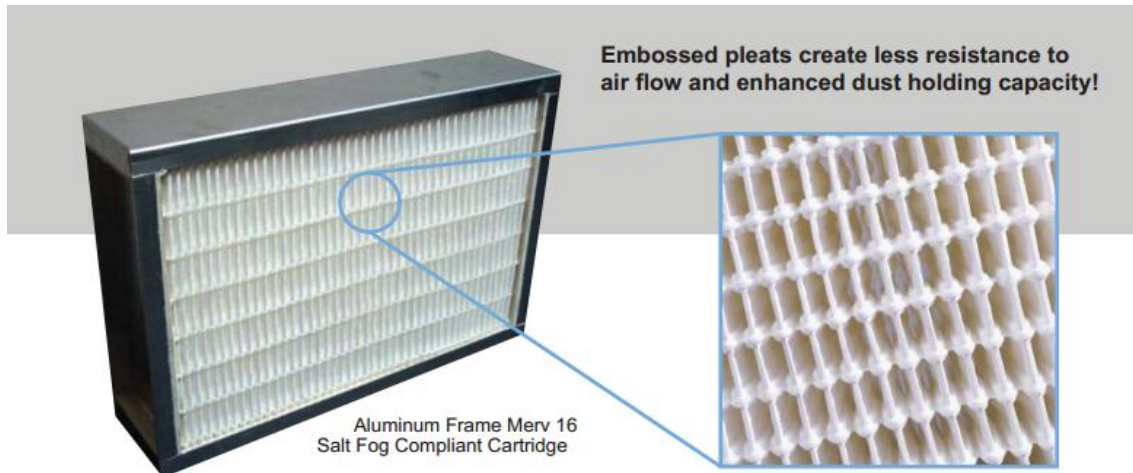
OEM Recommendations

The OEM suggests periodic cleaning to reclaim lost cooling capacity of the base station. Such cleaning methods include water, cleaning solutions, wire brush, and/or compressed air.

Amplifiers: The OEM recommends performing cleaning of the amplifiers during routine maintenance windows so that they can be powered-down, taken out of the cabinet subrack and brushed to remove accumulated dust & grime from their heat sinks. Some operators attempt to perform maintenance with the amplifiers still operating in the subracks (to minimize service disruptions) by removing the amplifier section cover at the back of the base station cabinet and using a backpack leaf blower to try blowing the heat sinks clean. While dislodging some dust & debris, this method mostly forces dust deeper into the heat sinks, which further limits air flow to the amplifiers and exacerbates the original thermal problems.

Heat Exchangers: The OEM recommended procedure for cleaning the front door mounted HEX units involves removing & brushing the screen covers, pouring or squirting cleaning solution into the openings and then pouring water into the exhaust while the HEX unit is running. In theory, the cleaning solution will loosen the grime, the water will wash the accumulated dust & debris out of the heat exchanger core and the running fans will air dry the HEX, restoring it to optimum thermal performance. This process requires a large amount of water (5+ gallons, preferably under pressure).

Fresh Air Filters: The OEM filters are designed to last the life of the base station and must not be touched or cleaned. In cases where filter life is reduced due to local conditions, special replacement filters can be purchased from the OEM.



Aftermarket Options

Several aftermarket solutions have been developed to either eliminate or reduce preventative maintenance while improving the thermal performance of the base station equipment.

Amplifiers: Field trials and studies in the carrier network have proven the efficacy of bolt-on filter solutions. The easily accessible, low cost, deep media filter is washable, will last up to one year between cleanings and can be re-used up to 3 years depending upon local conditions. The photos below provide views of the amplifier filter frame - installed and with the cover removed - to show the filter media as well as field performance data taken at Carrier sites.



Heat Exchangers & Fresh Air Filters: Similar results have been demonstrated using a front mount filter frame on the heat exchanger inlet and the inlet to the Fresh Air Filter. In both cases, a thorough and proper cleaning of the OEM system is first required. Subsequent maintenance is then reduced to a 5 minute, low-cost filter change *once* per year.

