

COOLING STRATEGIES – MICROTCA CRATES INSIDE THE CABINET

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MTCA.4.1 THERMALS

POWER LOSSES IN AN MTCA.4.1 CRATE

- 12x ~160 W per AMC / RTM slot -> max. 2240 W heat dissipation
 - 2x MCH + RTM -> 160 W
 - 2x Cooling units -> 160 W
 - Power modules (88% efficiency) ~ 300 W heat dissipation
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- Crate heat dissipation > 2.86 kW

POWER LOSSES IN THE WHOLE CABINET

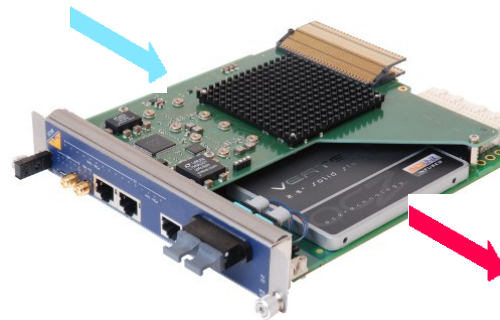
- 3 to 4 MTCA Crates + other Electronics
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- Cabinet heat dissipation -> 8 to 12 kW



CRATE COOLING OPTIMIZATION

CRATE & MODULES MUST BE OPTIMIZED FOR AIR FLOW

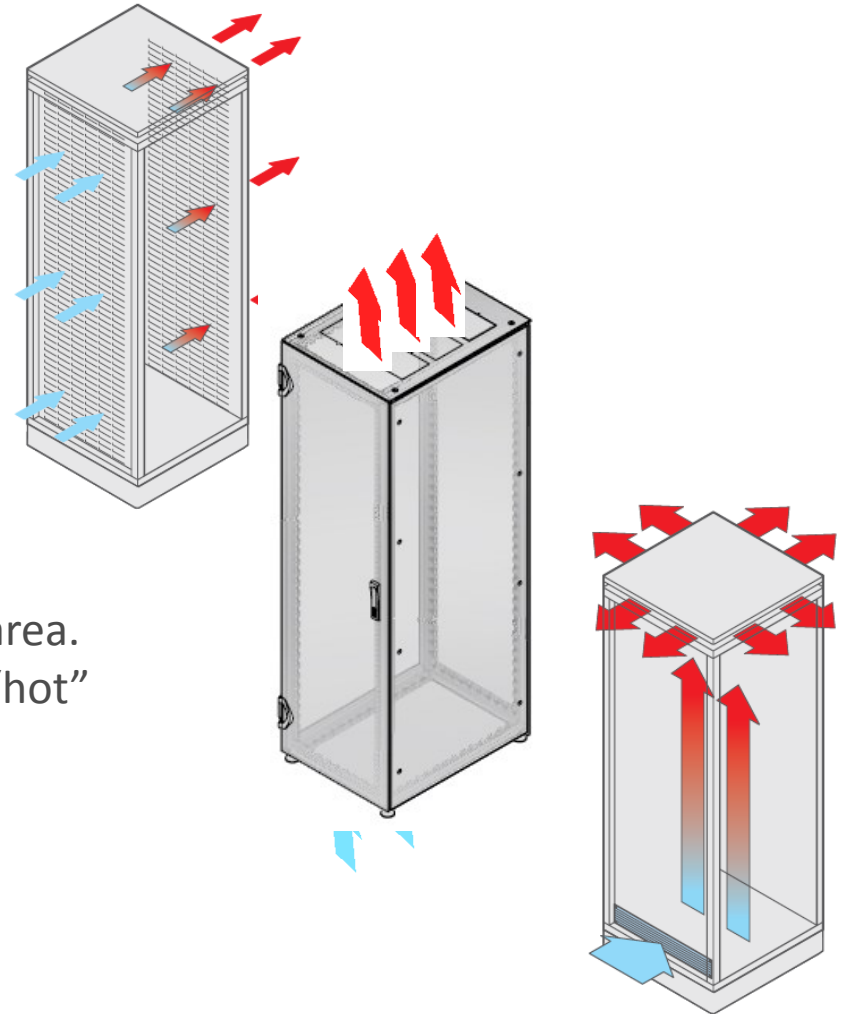
- Guarantee sufficient bulk air flow of the crate
- Proper air distribution to each slot inside the chassis
- Air impedance balancing of AMC modules / slots
- Cover empty slots with filler panels, either with or without air blockers
- MCH and AMC modules must be optimized for air flow and hot spot cooling



CABINET / RACK COOLING

DIFFERENT PHILOSOPHIES FOR CABINET COOLING

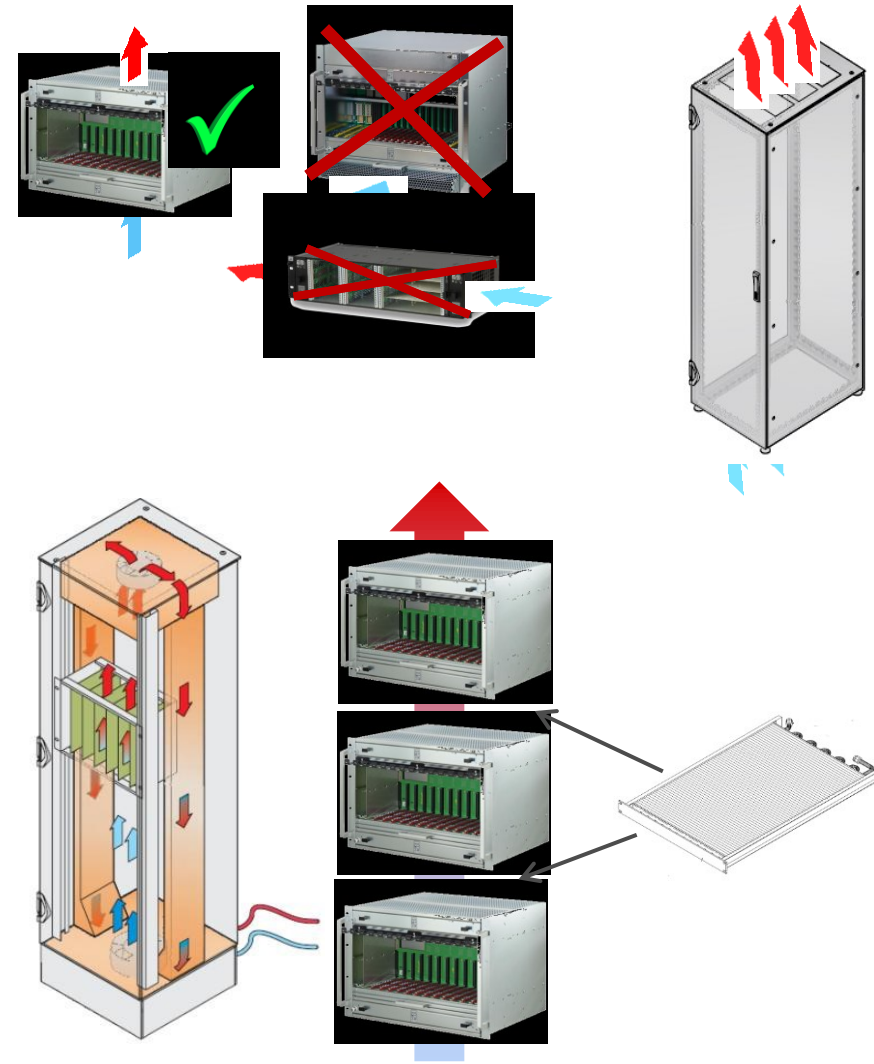
- Front to back
 - Used widely in Server applications
- Bottom to top
 - Using the natural way of heated air
- Bottom front to (rear) top
 - Room in front of the Crates is the “cold” area. Everything behind the 19” flanges is the “hot” air area



COOLING MTCA CRATES INSIDE THE CABINET

BOTTOM TO TOP

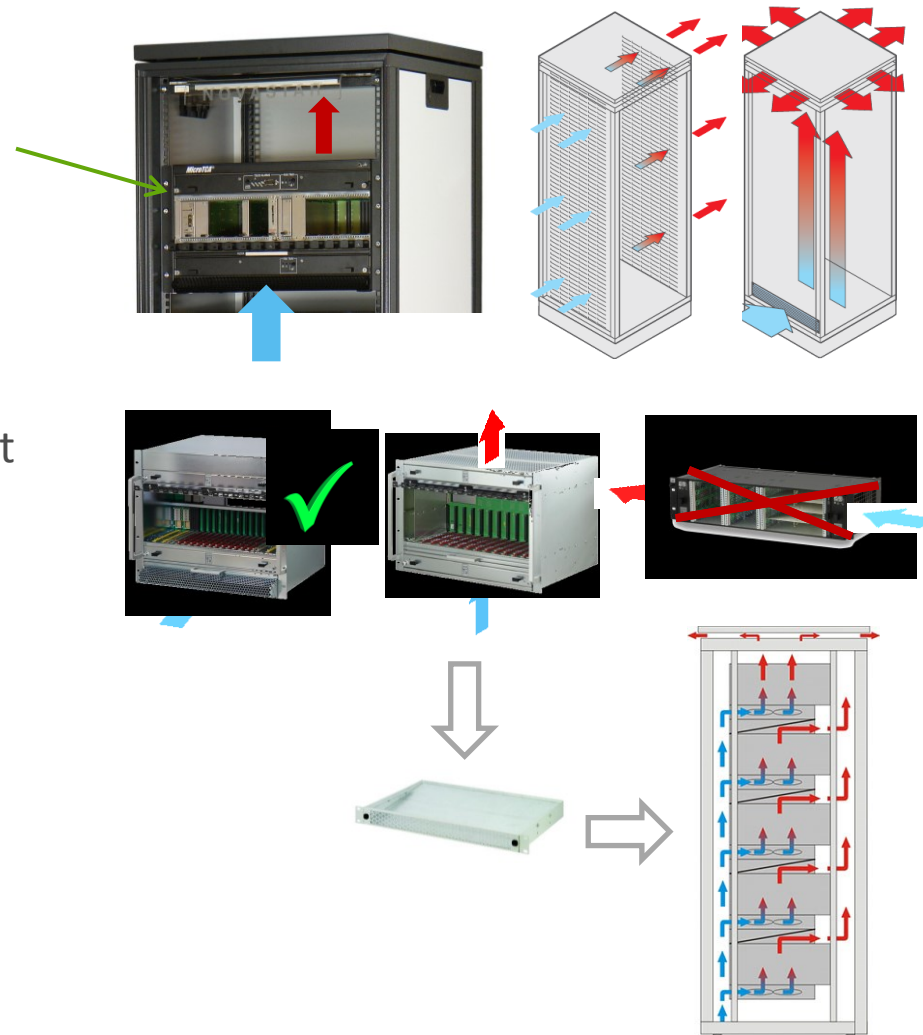
- Requires MTCA chassis with bottom to top air flow
- Chassis with front to back or side to side will not get sufficient air
- Warm air from the lower crate will be the inlet air for upper crate
- Air flow can be optimized with water cooling
 - Dedicated cabinet ventilation with water heat exchanger
 - Air chiller in between the MTCA Crates



COOLING MTCA CRATES INSIDE THE CABINET

FRONT TO BACK / BOTTOM FRONT TO (REAR) TOP

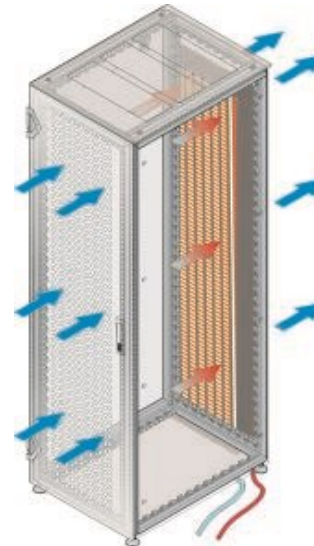
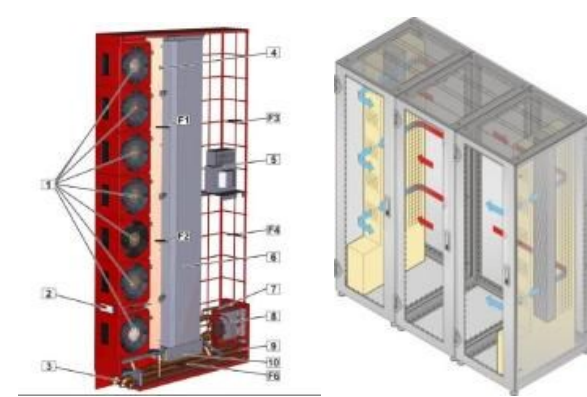
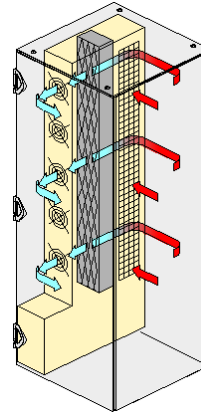
- Divider between cold and hot air is the front 19" flange
- MTCA Crates must be adapted to the Cabinet cooling concept
 - Front air inlet, rear air outlet
 - Bottom to top air flow Crate only works with air guiding devices below and above the Crate



COOLING MTCA CRATES INSIDE THE CABINET

FRONT TO BACK

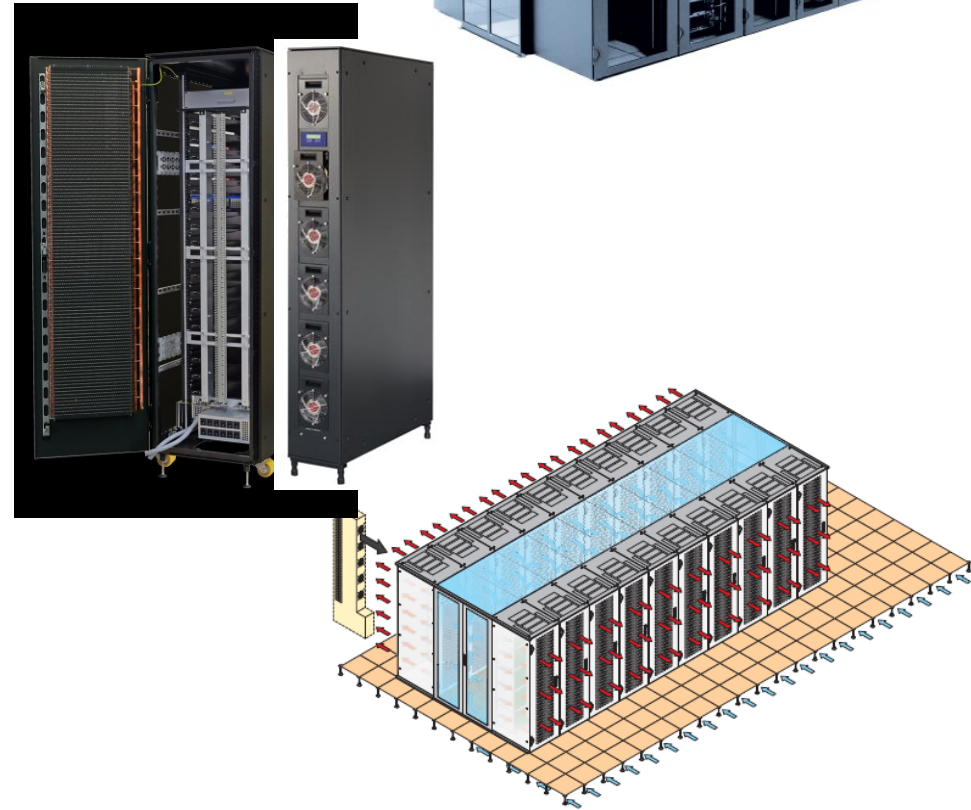
- Solutions to enhance the cooling capability with water cooling
- Water heat exchanger inside the Cabinet
 - Closed System
 - For one Cabinet or a row of cabinets
- Rear door cooler
 - For Cabinets with perforated front and rear doors
 - Passive device, Crate fans pushing the air through the chiller



COOLING CONCEPT

ISLE CONTAINMENTS

- Separating the cold and warm air areas inside the data center
- Cold isle containment:
 - Cabinet fronts are inside the containment
 - Cold air is provided to the containment
 - Works with inrow or rear door coolers

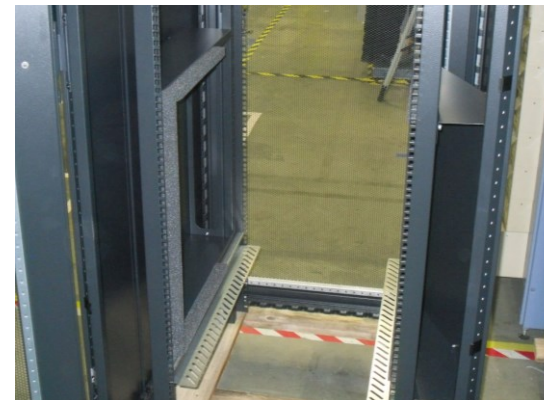
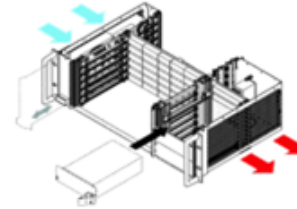


AMC's and RTM's are equally cooled

COOLING MTCA CRATES INSIDE THE CABINET

CRATES WITH SIDE TO SIDE COOLING

- To achieve minimum crate height, card cages can be built for horizontal mount of the AMC modules
- ATTENTION: Air flow can be right to left or left to right (MTCA is usually right to left)
- Doesn't fit to Cabinet cooling concepts
- Dependent on the space in the side of the Cabinet and what is installed (cables?)
- Workarounds to adapt the air flow direction (some more professional than the others)



COOLING MTCA CRATES INSIDE THE CABINET

HORIZONTAL CARD CAGE IN FRONT TO BACK CABINET

- Front to back cooling in MTCA crate with horizontal card cage
- Independent from Cabinet
- No special adaptations in Cabinet required
- Requires an additional U in height
- Requires fans with high air pressure due to “complicated” air flow through Crate

