Note on Temperature and Power load of 8 antennae GWB system.

A New rack of 1865(42U)x1200x600 (HxDxW) acquired from Jyoti Tech has been modified to suit our requirements and to achieve the desired goals ;

The following are the desired goals :
1. Reduce the failure of components by providing sufficient & regular cooling at all points in a rack and all the time.
2. By doing simple modifications / additions to racks, bring down the cost of racks to be acquired.
3. Drastically reduce the running cost of AC plant by utilizing the cool air efficiently. And
4. Use the infrastructure available with us to it's best by using the space and cool air in such a way, to meet our expectations.

Modifications have been done in the new rack before using to integrate 8 Antennae GWB system.

The following modifications are done :
1. Two fans mounting arrangement with mesh in the top cover. And cutting the fixing angles which obstructs the mounting of fans. Also one hole with rubber "gland grommet for cables" entering the rack.
2. Cables Termination plate with Screen Printing of name/number of Antennae.
3. Fixing of all the side plates inside the rack with grub screws.
4. Slot in the side Plate for cables movement.
5. An aluminium plate to close the gap between units at the middle of rack.
6. Two fans mounting arrangement with mesh in the bottom cover.
7. An aluminium plate to close the gap behind the fans mounted in the bottom cover.
8. An arrangement to close the gap between the rack and false wooden floor.
9. Metal block to rack's legs(4 no's per rack) to increase the height.
 NOTE : minimum required modifications done in the rack used for testing (except 3,8 & 9)

After Modifications in the rack, integration of units done.

New Rack has the following units :
1. Node machines T630 – 4 No's.
2. ROACH boards with 2 iADC's – 4 No's.
3. CLK/PPS unit – 1 No.
4. Infiniband Switch – 1 No.
5. Ethernet Switch 10/100 – 1 No.

Testing Procedure :

GWB3 : 4 nodes from new rack and 4 nodes from old 16 antennae GWB3 have been used. No inputs to iADCs. GWB configured using GWB3.3 version. Teperature sensors placed at front bottom (where cool air enters from the false flooring and 2 fans of 360cfm each sucks-in the cool air) as Inlet1, at front top as inlet2, backside bottom as outlet1 and backside top as outlet2 (where 2 fans of 360cfm each are mounted to sucks-out the hot air). Sensors powered using 9volts power supply and output from these 4 sensors fed to pin number 2,3,4 & 5 of Rabbit card(ip 192.168.4.152). Monited on computer using ehternet connection form every 15 minutes. Also recorded the node machines temperature (id0 & id1 corresponds to processers 1 & 2). These temperature and power load readings recorded without and with configuring the GWB system.

Conclusions :

A. Temperature (in Degree Celsius) :

	GWB3 sytem	
	Halted(not configured)	Started (configured)
Maximum Temperature @ outlet of rack	14	18.5
Maximum Temperature Difference	6	10.6

For 2760 watts of load (new rack) and Temperature difference of 10.5 degree celsius, we need 45% of the cool air duct of 1000cfm.

B. Node Temperature (in Degree Celsius) :

Maximum in 31 & 35 degree Celsius for d0 & id1 corresponds to processers 1 & 2.

C. Current measured @ MCB board inside of the correlator room using tongue tester.

When GWB3 configured :
a. 16.8 amps initially (maximum). 17 * 230 = 3910 watts
b. 12.1 amps   12 * 230 = 2760 watts.

So **maximum** power requirement is 3.9KW per Rack.
For Total 30 antennae GWB System : 3.9kw * 4(racks) + 1.2kw(5th rack) = 16.8KWs

This matches with my theoratical calculations (please refer my report "ReportCoolingAndTemperatureVer3.pdf").
The report has typical and maximum power consumptions as 12.3kw and 21.46kw respectively.