IMH/AKB : 01 / 11 / 2017

The proposed scheme for discussion and fine tuning before implementation, which is part of re-distribute cum increasing the UPS capacity exercise to handle the present correlator system load and also to address the short term expansion needs.

Part A : UPS 1 (one of the existing 20 KVA)

Table 1 : Only <u>essential</u> GSB system units.

Sl #	MCB Number	Units / Load	Cons'n in Amps	Remarks
1	11	GSB Rack 1 (Top E.B.)	4.0	ADC node1 to 7 & PPS/CLK
2	12	GSB Rack 1 (Bottom E.B.)	6.4	ADC node 8 to 16 + spare 1.
3	13	GSB Rack 2 (Top E.B.)	5.8	Node 17 to 20, eth s/w – 3 nos
4	14	GSB Rack 2 (Middle E.B.)	7.6	Node 21 to 26 (6nos)
5	15	GSB Rack 2 (Bottom E.B.)	7.6	Node 27 to 32 (6nos)
	Sub Total of Row 1		**31.4**	
6	16	GSB Rack 3 (Top E.B.)	3.5	Node 33 to 35 & s/w's – 2nos.
7	17	GSB Rack 3 (Middle E.B.)	5.8	Node 36 to 42 (7nos)
8	18	GSB Rack 3 (Bottom E.B.)	4.8	Node 43 to 48 (6nos)
9	19	GSB Rack 4 (Top E.B.)	2.5	Node 49,50 & s/w's – 2 nos.
10	1a	E.B. - 225	3.0	Fans of Rack1&2, & Mon.1
11	1b	E.B. - 226	2.0	Fans of Rack3&4, TempMon.1 & Power Supply – 1no.
12	1c	E.B. - 227 (GSB Rack 5)	3.0	gsbm1 to gsbm6 m/c & HDDs
13	1d	E.B. - 228 (GSB Rack 6)	2.0	GSB node 51 to 54.
	Sub Total of Row 2		**26.6**	
	Grand Total		**58.0**	

Note : 1. Here, UPS utilization is rectricted by the line filters ie 60amps. So UPS is utilized for 69% only. If we consider line filter will support upto 66 amps (+10%), this will accomodate the marginal increase of load in few modes like full stokes with IA & PA on.

Warning : No margin left to add any more units on this UPS.

Part B : UPS 2 (New 40/50KVA)

Table 1 : (CKT 1 : R + N) , Load - GWB system racks 1 , 2 and 3.

Sl #	MCB Number	Units / Load	Cons'n in Amps	Remarks
1	111	GWB Rack 1	10.6	Remove Raw Voltage m/c.
2	112	GWB Rack 2	10.6	
3	113	GWB Rack 3(m/c's -5, s/w's, HDDs)	7.9	Replace 5 m/c's by T630 m/c.
	Sub Total of Row 1		**29.1**	

Note : max. Current 11amps * 3 racks = 33 amps. So 7 amps margin to add some more load, if need arises. Since this is the important and fluctating load, so more margin is better.

Table 2 : (CKT 2 : Y + N), Load - GWB system racks 4 , 5 and 6.

Sl #	MCB Number	Units / Load	Cons'n in Amps	Remarks
1	211	GWB Rack 4 (m/c's -5, s/w's, Inst'ts)	7.9	With temperature m/c's-2nos.
2	212	GWB Rack 5	10.6	
3	213	GWB Rack 6	10.6	
	Sub Total of Row 1		**29.1**	

Note : max. Current 11amps * 3 racks = 33 amps. So 7 amps margin to add some more load, if need arises. Since this is the important and fluctating load, so more margin is better.

Table 3 : (CKT 3 : B + N), Load - Auxilary load of GSB, PDS, POCO and misc load like Server/online/webpage m/c's.

Sl #	MCB Number	Units / Load	Cons'n in Amps	Remarks
1	311	GSB Rack 4 (Middle E.B.)	8.0	N111 to N118 (8 nos)
2	312	GSB Rack 4 (Bottom E.B.)	7.0	CITA1 to CITA7 (7 nos)
3	313	E.B. @ GSB Rack 5	2.0	R210 m/c & monitors-2,
4	314	E.B. @ GSB Rack 6	2.0	casper m/cs- 3, online-1, b/up -1, .5 n/w eth s/w – 1,

5	315	E.B. @ GSB racks 5&6 (Spare).	0.1	
6	316	E.B. @ GWB Rack 4 (Middle)	1.0	Temperature m/c's – 2 nos.
7	317	E.B. @ Half height Racks – 2nos.	2.5	POCO(R720-1,R210-1,ROACH-2,Trig/CLK-1) and T620-1, N.S.-1 etc..
8	318	Parallel Data System (E.B. Bottom)	17.8	8 m/c's with GPU
	319		--	
	31a	Lamps	0.5	
	Grand Total		**40.9**	

Note : 1. If need arises to reduce some load then, we may unload in the following way as per requirement.

a. NCRA Nodes – 8 nos. About 8 amps. Connected on MCB 311

b. CITA Nodes – 7 nos. About 7 amps. Connected on MCB 312

c. Part of the PDS – say 4 nos. out of 8. About 10amps. Connected on MCB 318

d. POCO+ racks – About 2.5 amps. Connected on MCB 317

..... old tables appended below .....

IMH 13/10/2017

The following scheme may be implemented in the correlator room for electric power distribution after discussion.

Table 1 : UPS ratings and maximum useable electric power.

UPS No.	UPS Ratings	Max. useable	Remarks
UPS 1	20 KVA, 87 Amps.	60Amps	Restricted by Power line filter(60amps) ie 69% .
UPS 2	20 KVA, 87 Amps.	60Amps	Restricted by Power line filter(60amps) ie 69% .
UPS 3	12.5 KVA, 54.3Amps.	43.5Amps	restricted by max. usage of UPS capacity ie 80% (power line filter is 60amps).

MCB Number. : First Digit ---> UPS Number
Second Digit ---> Row Number in the Distribution box inside the correlator room.
Third Digit ---> MCB Number in the distribution box.

Electric power distribution scheme (proposed) for ;

Table 2 : UPS 1 : Only <u>essential</u> GWB system units.

Sl #	MCB Number	Units / Load	Cons'n in Amps	Remarks
1	111	GWB Rack 1	10.6	Remove Raw Voltage m/c.
2	112	GWB Rack 2	10.6	
3	113	GWB Rack 3(m/c's -5, s/w's, HDDs)	7.9	Replace 5 m/c's with new m/c.
	Sub Total of Row 1		**29.1**	
4	121	GWB Rack 4(m/c's -5, s/w's, instr's.)	7.9	Move Temp'r m/c's to .
5	122	GWB Rack 5	10.6	

6	123	GWB Rack 6	10.6	
	Sub Total of Row 2		**29.1**	
	Grand Total		**58.2***	

* Since these readings are not maximum, may increase marginaly. So we have to keep about 2 amps margin.

MCB's : Row input – 40amps & individual – 16/20amps.

Table 3 : UPS 2 : Only <u>essential</u> GSB system units.

Sl #	MCB Number	Units / Load	Cons'n in Amps	Remarks
1	211	GSB Rack 1 (Top E.B.)	4.0	ADC node1 to 7 & PPS/CLK
2	212	GSB Rack 1 (Bottom E.B.)	6.4	ADC node 8 to 16 + spare 1.
3	213	GSB Rack 2 (Top E.B.)	5.8	Node 17 to 20, eth s/w – 3 nos
4	214	GSB Rack 2 (Middle E.B.)	7.6	Node 21 to 26 (6nos)
5	215	GSB Rack 2 (Bottom E.B.)	7.6	Node 27 to 32 (6nos)
	Sub Total of Row 1		**31.4**	
6	221	GSB Rack 3 (Top E.B.)	3.5	Node 33 to 35 & s/w's – 2nos.
7	222	GSB Rack 3 (Middle E.B.)	5.8	Node 36 to 42 (7nos)
8	223	GSB Rack 3 (Bottom E.B.)	4.8	Node 43 to 48 (6nos)
9	224	GSB Rack 4 (Top E.B.)	2.5	Node 49,50 & s/w's – 2 nos.
10	225	E.B. - 225	3.0	Fans of Rack1&2, & Mon.1
11	226	E.B. - 226	2.0	Fans of Rack3&4, TempMon.1 & Power Supply – 1no.
12	227	E.B. - 227 (GSB Rack 5)	3.0	gsbm1 to gsbm6 m/c & HDDs
13	228	E.B. - 228 (GSB Rack 6)	2.0	GSB node 51 to 54.
	Sub Total of Row 2		**26.6**	
	Grand Total		**58.0**	

* Since these readings are not maximum, may increase marginaly. So we have to keep about 2 amps margin.

MCB's : Row input – 40amps & individual – 16/20amps., C type

Table 4 : UPS 3 : Auxilary load of GSB, GWB systems and misc load like .

Sl #	MCB Number	Units / Load	Cons'n in Amps	Remarks
1	311	GSB Rack 4 (Middle E.B.)	8.0	N111 to N118 (8 nos)

2	312	GSB Rack 4 (Bottom E.B.)	7.0	CITA1 to CITA7 (7 nos)
3	313	E.B. @ GSB Rack 5	2.0	R210 m/c & monitors-2,
4	314	E.B. @ GSB Rack 6	2.0	casper m/cs- 3, online-1, b/up -1, .5 n/w eth s/w – 1,
5	315	E.B. @ GSB racks 5&6 (Spare).	0.1	
6	316	E.B. @ GWB Rack 4 (Middle)	1.0	Temperature m/c's – 2 nos.
7	317	E.B. @ Half height Racks – 2nos.	2.5	POCO(R720-1,R210-1,ROACH-2,Trig/CLK-1) and T620-1, N.S.-1 etc..
8	318	Parallel Data System (E.B. Bottom)	17.8	8 m/c's with GPU
	319		--	
	31a	Lamps	0.5	
	Grand Total		**40.9**	

Note : 2 MCB's to be added by making the Row MCB (replacing 4 pole by 2 pole).

Total : 58.2+58+40.9 = 157.1 Amps.

Measurement of Current of correlator systems

Table 1 : Rackwise electrical power distribution

Table 2 : UPS1 MCB/Extension Boards/units wise electrical power distribution details.

Table 3 : UPS2 MCB/Extension Boards/units wise electrical power distribution details.

Table 4 : UPS3 MCB/Extension Boards/units wise electrical power distribution details.

Table 1 : RACK WISE ELECTRICAL POWER DISTRIBUTION :

UPS details	Line Filter	System Load	Load (system ON, but not in use for observ'n)	Max. load (system in use for observ'n)	Remarks
UPS 1 20KVA 87Amps	60 Amps	GWB racks 1 to 6 & POCO+ - 2 half height racks	56% 44 Amps	85% 66.8* Amps	
UPS 2 20KVA 87Amps	60 Amps	GSB rack2, rack3 & Node52 to 54 and Casper sever m/c's – 4nos, online m/c -1 no.	56% 44 Amps	66% 57.4 Amps	

UPS 3 12.5KVA 54.3Amps	60 Amps	GSB rack1, rack4 , gsbm1 to gsbm6 m/c's node51 and R210 1U m/c – 1 no., HDD's	50% 25 Amps	70% 38 Amps	
52.5 KVA 228.3 Amps		Grand Total	49.5% 113 Amps	73.6% 162.2 Amps	

* GWB rack3 has only 3 m/c's. We are planning to chage them with T630 m/c's and add 2 more m/c's. (Total – 5 nos.). So currnet requirement will increase by 4.3 Amps.

* We are planning to add 1 rack with 6 m/c's with GPU cards in the correlator room as part of the 4 racks Parallel Data System (PDS). So

<u>Note</u> : Refer the following tables mainly for the units of the racks connected to MCB's. Current(Amps) readings mentioned here are on that particular day. So these readings are not maximum.

TABLE 2 : UPS1 MCB'S/EXTENSION BOARDS/UNIT WISE ELECTRICAL POWER DISTRIBUTION :

1. UPS 1 :

GWB system : 62 to 78% of 20 KVA, Under Use for tests by SHR @ 3:20pm to 3:50pm.

Row 1 (Top) : 29.2 Amps and Row 2 (Bottom) : 32.1 Amps Total : 61.3# Amps

61.3Amps * 230Volts = 14,099 watts OR 16.587KVA(PF-0.85) ie 83%

Sl. No.	Distribution board	Current in Amps	Units of the racks connected to MCB's.
1	GWB rack-1 : ROW1(top), MCB No. 1	12.2	5 m/c's & 4 ROACH
2	GWB rack-2 : ROW1(top), MCB No. 2	10.6	4 m/c's & 4 ROACH
3	GWB rack-3 : ROW1(top), MCB No. 3	3.6	3 m/c's, InfiniS/W, Instru-
4	Ext Board 1 : ROW1(top), MCB No. 4	0.6	Spare at GWB racks opposite wall.
5	GWB rack-4 : ROW2(top), MCB No. 1	7.9	5 m/c's,2Temp m/c's +
6	GWB rack-5 : ROW2(top), MCB No. 2	10.1	4 m/c's & 4 ROACH
7	GWB rack-6 : ROW2(top), MCB No. 3	10.6	4 m/c's & 4 ROACH
8	Ext Board 2 : ROW2(top), MCB No. 4	2.4	POCO(R720-1, R210-1,Roach-2, T620-1, Trig+Clk – 1 and instruments..
	Grand Total	60.0*	

TABLE 3 : UPS2 MCB'S/EXTENSION BOARDS/UNIT WISE ELECTRICAL POWER DISTRIBUTION :

1. UPS 2 :

GSB system : 56% of 20 KVA ie 11.2KVA, Under Use for tests by SHR @ 3:20pm to 3:50pm.

Row 1 (Top) : 27.8 Amps and Row 2 (Bottom) : 17.0 Amps Total : 44.8# Amps

44.8 Amps * 230Volts = 10,304 watts OR 12.122 KVA(PF-0.85) ie 60.6%

Sl. No.	Distribution board	Current in Amps	Units of the racks connected to MCB's.
1	GSB rack-2(EB3) : ROW1(top), MCB No. 1	7.3	Compute Nodes 27 to 32 (6 nos)
2	GSB rack-3(EB1) : ROW1(top), MCB No. 2	5.8	Compute Nodes 36 to 42 (7 nos)
3	GSB rack-2(EB1) : ROW1(top), MCB No. 3	5.8	ADC Nodes 17 to 20 & S/W - 3nos
4	GSB EXT 1 : ROW1(top), MCB No. 4	1.6	GSB rack fans & HDD's – 2 nos.
5	GSB EXT 2 : ROW1(top), MCB No. 5	--	GSB rack fans & Tempr monitors
6	EXT 26 : ROW1(top), MCB No. 6	2.1	Nodes 52 to 54 and Casper Server m/c's – 3, corr. w/p m/c -1, Online m/c -1 nos, & .5 n/w eth S/W – no.
7	EXT 27 : ROW1(top), MCB No. 7	0.7	Spare
8	Lamps : ROW1(top), MCB No. 8	0.1	Lamps
9	EXT 3 : ROW1(top), MCB No. 11	0.2	Spare behind GSB racks..
10	GSB rack-3(EB2) : ROW2(Bottom), MCB No. 1	4.8	Compute nodes 43 to 48 (6 nos)
11	GSB rack-2(EB2) : ROW2(Bottom), MCB No. 2	7.6	Compute nodes 21 to 26 (6 nos)
12	GSB rack-3(EB3) : ROW2(Bottom), MCB No. 3	3.5	Compute nodes 33 to 35 (3 nos) & s/w – 2 nos.
13	Lamps : ROW2(Bottom), MCB No. 8	0.2	Lamps
	Grand Total	39.7*	

TABLE 4 : UPS3 MCB'S/EXTENSION BOARDS/UNIT WISE ELECTRICAL POWER DISTRIBUTION :

1. UPS 3 :

GSB system : 64% of 12.5 KVA, Under Use for tests by SHR @ 3:20pm to 3:50pm.

Row 1 (Only) : 29.8# Amps

29.8 Amps * 230Volts = 6,854 watts OR 8.063 KVA(PF-0.85) ie 64.5%

Sl. No.	Distribution board	Current	Units of the racks connected to MCB's.

		in Amps	
1	GSB EXT 1 : ROW1, MCB No. 1	0.5	HDD's
2	GSB rack-1(EB1) : ROW1, MCB No. 2	4.0	ADC Nodes 1 to 7 and PPM/CLK unit – 1 and Distribution units -2 nos.
3	GSB rack-1(EB2) : ROW1, MCB No. 3	6.4	ADC Nodes 8 to 16 and one spare (10nos)
4	EXT 2 : ROW1, MCB No. 4	0.9	Node51, R210 PC monitor, gsbm5, gsbm6, HDDs and 5/12 volts P.S. - 1no.
5	GSB rack-4(EB3) : ROW1, MCB No. 5	6.1	Compute Nodes 49 & 50, s/w -1 and N111, N112 and N114.
6	GSB EXT 4 : ROW1, MCB No. 6	1.9	gsbm1 to gsbm4, HDDs
7	GSB rack-4(EB2) : ROW1, MCB No. 7	1.8	N113, N115 to N118, CITA1 to CITA3
8	GSB rack-4(EB1) : ROW1, MCB No. 8	3.7	CITA4 to CITA7 and cat5 S/W-1no.
	Grand Total	25.3*	

: Maximum on this day usage. * : Current varies during system use.