PRASAR BHARATI

DIRECTORATE GENERAL : ALL INDIA RADIO

(*TELECOM DIVISION*)

****

SPECIFICATIONS COVER SHEET

TITLE	:	Spares for CES/RNT in AIR Network
SPECIFICATION NO.	:	TC/SPEC/29/09/ CES-RNT spares
DATE OF LAST UPDATION	:	Aug. 2009
NO. OF PAGES	:	10
SCHEME	:	Maintenance Spares (Non-Plan)

SPECIFICATIONS FOR SPARES OF CES/RNT

1. STEREO LIMITER/ PROCESSOR *:*

The limiter/processor is to be 19" rack mountable. It should conform to following specifications-

A	**INPUT**	
1	Should be electronically balanced and floating, EMI-suppressed, separate for Left and Right.	
2	Input Impedance	: >10 Kohm Active balanced, EMI Suppressed
3	Nominal Level	: -10 dBm to +8 dBm
4	Maximum Input Level	: +20 dBm
5	Digital input	: AES/EBU Standard (Professional)in XLR

B	**Output**	
a	The limiter/ processor must have the electronically-balanced and floating outputs, separate for L&R Channels	
b	Output Impedance	≤600 ohms, active balanced, EMI Suppressed in XLR
c	Nominal Level	: Front panel adjustable
d	Maximum output Level	: +9 dBm
e	Digital output	AES/EBU Standard (Professional)
C	Frequency Response	20 Hz - 20 KHz : Within ± 0.5dB
D	Adaptive Pre-emphasis	Switchable and selectable to 50/75 micro sec
E	Cross talk	: ≤ –70 dB at 1 KHz,+9dBu
F	Harmonic Distortion	≤ 0.2% @ 1KHz,+9dBu
G.	Dynamic Range	>80 dB
H	Metering	Preferably LED bar graph for showing Gain Reduction and modulation level
I	Operating Temperature Range	: 0 - 50^{o}C

J	Protection against RF Interference:	The equipment shall be protected with adequate shielding against RF interference so as to perform satisfactorily as per specifications in the high power Uplink transmitter halls.
K	Indications:	LED/ level indicator should be provided for indicating various threshold levels.
L	Accessories :	The equipment shall be supplied complete with all mating connectors, input/output chords and power supply chord. Other optional accessories may be quoted separately

2. **C Band Splitter/Combiner (5850-6425 MHz)**

a	Type of combiner	Preferably passive type
b	No.of inputs	Two
c	Insertion loss	Typical 0.2db (Above 3.0 dB)
d	Port to port isolation	24 dB Minimum
e	Input impedance	50 ohm for RF
f	Output impedance	50 ohm for RF
g	Input/output return loss	12 dB or more

3. IF TO C-BAND UPCONVERTER (1+1) WITH AUTO CHANGEOVER UNIT

It should be possible to operate the Upconverter manually with front panel control. The Upconverter should not require a PC or a controller for normal operation and control. Upconverter (1+1) must have an auto changeover (Hot standby) mechanism. Changeover switch may be either an in-built one or an independent.

a	Input Frequency	52 MHz to 88 MHz
b	Input impedance	75 Ω
c	Input Return loss	20 dB or better
d	Input level	-20 dBm to +0 dBm
e	Input connector	BNC-F
f	Output Frequency	5850 MHz to 6425 MHz
g	Output Impedance	50 Ω
h	Output Return loss	19 dB or better
i	Output level	10 dBm or more at 1dB compression
j	Overall conversion gain	30 dB or more
k	Gain control Step size	0.2 dB steps or smaller
l	Gain Slope	± 0.05 dB/MHz
m	Type of conversion	Dual conversion spectrum not inverted
n	Amplitude response	± 0.5 dB over the input frequency range of 52 MHz to 88 MHz.
o	Third order IMD Products	-40 dBc with equal carriers at 10 dB total output Backoff
p	Phase noise	- 70 dBc/Hz,100 Hz away from carrier
		-80 dBc/Hz,1KHz away from carrier
		-100dBc/Hz,1MHz away from carrier
q	Frequency stability	Better than $\pm 1 \times 10^{-8}$ over temp 0 to 50degrees Celsius $\pm 1 \times 10^{-9}$ or better per day
r	Gain stability	± 0.25 dB per day at constant temp
s	Spurious	-60 dBc or better
t	Frequency setting	Synthesised with minimum 125 KHz step size
u	Standby operation	1+ 1 hot redundancy auto change- over preferably with manual over ride.

v	Mounting	19" Rack
w	Test port	RF and IF
x	Remote Interface	RS-232 RS-484 Parameter settings: Frequency, gain, fault Status, attenuation, RF on/off, etc.
y	LED Indications	Power,standby,LO fault, Remote/Manual etc

4. DEHYDRATOR

A dehydrator for removal of accumulated moisture from the wave guide, couplers etc. connecting HPA output to the antenna shall be quoted.

1	Air Capacity	60 Litres / Hour max.
2	RF-line pressure	Adjustable Upto 0.35 bar
3	Pressure control	RF line pressure adjustable reduction valve
4	Over pressure protection	Automatic through safety valve
5	Pressure indication	Pressure gauge for the complete range of pressure

5. C-BAND LNBC

a)	Input freq.	3700-4200 MHz
b)	Input impedance	50 Ω
c)	Input connector	WR 229 G Flange
d)	Output frequency	950 - 1450 MHz
e)	L.O.Stability	PLL, better than ± 2 PPM over the temp. range 0° to 50°C and over 24 hrs.
f)	Noise temperature	≤ 45°K
g)	Conversion gain	55 dB or more
h)	Gain flatness	± 2 dB over full band
i)	Min. Image rejection	-45 dB
j)	Spurious/harmonics	50 dB below carrier
k)	Phase Noise 1 KHz 100 KHz	 -65 dBc/Hz -80 dBc/Hz
l)	Output impedance	75 Ω
m)	Power supply	+ 15 V to + 24 V through output connector

6. L Band Passive Splitter: Only good quality professional grade splitter may be quoted with following specifications-

(a)	Type of splitter	passive type
(b)	No.of outputs	Four
(c)	Division loss	≤ 7.5 dB Typical
(d) (e)	Input impedence Output impedenc	75 ohm 75 ohm

7. DIGITAL RECEIVER (DEMODULATOR + DECODER)

The digital receiver should conform to the standard & specifications of the existing digital radio networking system. The existing digital encoder & modulator are of Radyne Comstream make. So receiver should be compatible with the same.

i)	Input a) Freq. Range b) Freq. Tuning c) Impedance d) Level	 950 - 1450 MHz Resolution ≤ 25 KHz Local (remote control optional) 75 Ω ≤ -25 to -70 dBm
ii)	Demodulation	QPSK (Optional BPSK user selectable)
iii)	Carrier lock range	≥ ±500 KHz
iv)	FEC decoding	Viterbi ½ (3/4 optional) Seq 1/2
v)	Audio coding	ISO/MPEG-I/Layer-2
vi)	Data rates (Selectable)	64, 128, 192 & 256,kbps (QPSK) 64, 128, 192 & 256 kbps (BPSK)
vii	Modes	Mono, Dual mono & Joint stereo
vii	Audio output a) Impedance b) Level (Maximum) c) T.H.D. (at 1 KHz) d) Audio signal bandwidth e) Frequency response	 Balanced, 600 Ω + 8 dBu(adjustable) ≤ 0.2% (at +8 dbm output at 1kHz) 20 Hz to 20 KHz ± 1.0 dB (20 Hz to 20 KHz)

	f) Signal to Noise ratio g) Dynamic range h) Cross-talk ratio i) Audio output channels j) Digital Audio output	≥ 70 dB at +8 dbu ≥ 80 dB ≥75 dB. Two mono/one stereo AES / EBU STANDARD (Professional)
ix)	Required Eb/No (B.E.R. ≤10 E -5)	≤5.5 dB(QPSK) , ≤5 dB (BPSK)
x)	B.E.R. Immunity At 128 kbps, QPSK, seq. ½ at 5.5 Eb/No	1x 10E-5 for no subjective loss in quality
xi)	Audio Sampling Rate	48 KHz
xii)	Stereo Phase deviation	Less than 1.5° for 20 Hz to 10 KHz; Less than 3° for 10 KHz to 20 KHz.
xiii)	Auxillary data channel a) Data rate b) Interface	 ≥ 4.8 Kbps RS – 232
xiv)	Supply for LNBC	+14 V to +24V DC through centre conductor of RF cable

8. L band Amplifier

Features :

a) Capable of handling voltage required for LNBC.
b) Provision for wall mount installation

1.	Frequency of operation	950-1750 MHz
2.	Input level	- 80dBm to -50 dBm
3.	Input and Output Impedances	75Ω
4.	Input/ Output return loss	≥8dB
5.	Noise figure (typical)	<8 dB
6.	Gain(User adjustable on front panel)	≥24 dB
7.	Gain flatness(Over entire band)	± 2 dB
8.	Operating voltage(Through centre conductor of the RF cable)	+14V to +24 VDC

9. Specification of 10 Watt Monitoring Amplifier

FEATURES

The amplifier shall essentially have the following features:

a. Protection against current overloads: The amplifier should mute in case of overload and revert to normal functioning once overload ceases to exist.

b. Protection against thermal overload: Temperature of power pack and heat sinks of both channels should be monitored continuously and the amplifier should get muted with a visual indication whenever temperature exceeds permissible limits. In case of excessive temperature of heat sinks, the amplifier should be protected, by fuse blow up or by any other suitable measures.

c. Monitoring amplifier output should be continuously monitored for DC components or very low frequency components which might endanger speaker if present for longer durations. Amplifier output should get blocked in such an eventuality.

d. The amplifier should have protection against open circuit, full short circuit, ultrasonic frequencies and RF.

e. Necessary function switches such as volume/gain control, low and high frequency filters should be available on front panel. These controls shall be rugged and reliable.

INPUTS & OUTPUTS

1.	No. of inputs(Stereo)	:1 set(2 mono),(XLR female connector)
2.	Input level	
	a) Nominal level	: 0 dBu
	b) Range	: -10 dBu to +10 dBu for rated output
3.	Input impedance	: ≥10 k ohms (balanced)
4.	CMRR (20 Hz – 20 kHz)	: ≥ 60 dB
5.	Output impedance	: 8 ohms.
6.	Power Output	:10 W rms continuous per channel at 8Ωl.
7.	Frequency Response With reference to 1 kHz over The entire range of 20 Hz to 20 kHz	: Better than $\pm$ 1 dB
8.	Total Harmonic Distortion	: ≤ 0.5% at rated output at 1 kHz
9.	Signal-to-noise-ratio With input shorted and at rated output (unweighted rms) at 0dBu input (22 Hz- 22 kHz)	: Equal to or better than 85 dB
10.	Damping factor	: > 75 into 8 ohm at <1 kHz

11. Power supply	: The amplifier shall work on 230V $\pm$ 10%, 48-52 Hz single phase AC supply
12. Level difference between the channels	: Equal to or less than 0.5 dB
13. Phase difference between the channels	: < $\pm 10^0$, 20 Hz to 20 kHz
14. Inter-channel X-Talk isolation at 15 kHz	:≥ 75 dB at nominal level

ACCESSORIES

i) All necessary accessories like power cord and mating connectors shall be supplied along with the units. The standard accessories should be clearly mentioned in the quotation.

ii) Optional accessories if considered useful/ recommended by the supplier should be quoted separately.

MECHANICAL

The amplifier should be 19" rack mounting type.

ENVIRONMENTAL CONDITIONS

A. The equipment shall be capable of performing satisfactorily in the dry temperature range of 0 ^{0}C to 50 ^{0}C and damp heat conditions up to 40 ^{0}C at 90% RH non-condensing.

B. The amplifier shall work on natural cooling without employing cooling fan.

C. A test certificate from an approved test house shall have to be produced.