

Specification for spares of CES/RNT

1. STEREO LIMITER/ PROCESSOR :

The limiter /processor is to be supplied in 19" rack chassis. It should conform to the following specifications:

A INPUT :

- (a) Should be electronically balanced and floating, EMI-suppressed, separate for Left and Right.
- (b) Input Impedance : >10 Kohm Active balanced, EMI Suppressed
- (c) Nominal Level : -10 dBm to +8 dBm
- (d) Maximum Input Level : +20 dBm
- (e) Digital input : AES/EBU Standard (Professional)

B OUTPUT :

(a) The limiter/ processor must have the electronically-balanced and floating outputs, separate for L&R Channels

- (b) Output Impedance : 600 ohms
- (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 ± 0.25 dB

D Adaptive Pre-emphasis : Switchable and selectable to 50/75 micro sec.

E Cross talk : ≤ -70 dB at 15 KHz

F Harmonic Distortion : < 0.1%

- G. Dynamic Range : >80 dB
- H Metering : Preferably LED bar graph for showing Gain Reduction and modulation level
- I Operating Temperature Range : 0-40°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. IF COMBINER & C- BAND COMBINER (5850 - 6425 MHz)

- (a) Type of combiner : Preferably passive type
- (b) No.of inputs : Four (2-way and 6 way combiners may also be quoted as option)
- (c) Insertion loss : 2 dB or less for two way combiner (For 4-way and 6-way combiners the loss should be specified).
- (d) Port to port isolation : 30 dB
- (e) Input impedance : 75 ohm for IF, 50 ohm for RF
- (f) Output impedance : 75 ohm for IF .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 change over(hot standby) mechanism . Change over 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 +1 dBm
e)	Input connector	:	BNC-F
f)	Output Frequency	:	5845 MHz to 6425 MHz
g)	Output Impedance	:	50 Ω
h)	Output Return loss	:	19 dB or better
i)	Output level	:	$\geq +10$ dBm or more
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
l)	Type of conversion	:	Dual conversion spectrum not inverted
m)	Amplitude response	:	± 0.5 dB over the input frequency range of 52 MHz to 88 MHz.
n)	Third order IMD Products	:	-40 dBc with equal carriers at 10 dB total output Backoff .
o)	Phase noise	:	- 70 dBc/Hz,100 Hz away from carrier -80 dBc/Hz, 1 KHz away from carrier -100 dBc/Hz, 1 MHz away from carrier
p)	Frequency stability	:	Better than $\pm 1 \times 10^{-8}$ over temp 0 to 50 degrees Celsius $\pm 1 \times 10^{-9}$ or better per day
q)	Gain stability	:	± 0.25 dB per day at constant temp.
r)	Spurious	:	-60 dBc or better

s)	Frequency setting	:	Synthesised with minimum 125 KHz step size
t)	Standby operation	:	1+ 1 hot redundancy auto change-over preferably with manual over ride.
u)	Mounting	:	19" Rack
i)	Test port	:	RF and IF
w)	Remote Interface	:	RS-232 RS-484 Parameter settings:Frequency,gain,fault Status,priority,etc.
x)	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 should also be quoted. It should be compatible with the feed system and HPA system etc.

1.	Air Capacity	60 Litres / Hour max.
2.	RF-line pressure	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. S - BAND LNBC

a)	Input frequency	2500 – 2700 MHz
b)	Input impedance	50 Ω
c)	Input connector	N type
d)	Input/output return loss	> 12 dB
e)	Output frequency	950 - 1150 MHz
f)	L.O.Stability	PLL, better than ± 5 KHz over the temp. range 0° to 50°C and over 24 hrs.
g)	Noise temperature	Less than 45°K
h)	Conversion gain	55 dB or more
i)	Gain flatness	± 2 dB over full band

j)	Min. Image rejection	-50 dB
k)	Spurious/harmonics	50 dB below carrier
l)	Phase Noise	
	1 KHz	-60 dBc/Hz
	100 KHz	-80 dBc/Hz
m)	Output impedance	75 Ω
n)	Power supply	+ 15 V to + 24 V through output connector

6. C-BAND LNBC

a)	Input frequency	3700 – 4200 MHz
b)	Input impedance	50 Ω
c)	Input connector	WR 229 G Flange
d)	Input/output return loss	> 12 dB
e)	Output frequency	950 - 1450 MHz
f)	L.O.Stability	PLL, better than ± 2 PPM over the temp. range 0° to 50°C and over 24 hrs.
g)	Noise temperature	Less than 35°K
h)	Conversion gain	55 dB or more
i)	Gain flatness	± 2 dB over full band
j)	Min. Image rejection	-60 dB
k)	Spurious/harmonics	50 dB below carrier
l)	Phase Noise	
	1 KHz	-60 dBc/Hz
	100 KHz	-80 dBc/Hz
m)	Output impedance	75 Ω
n)	Power supply	+ 15 V to + 24 V through output connector

7. ANALOG SCPC RECEIVER WITH L-BAND INPUT

i)	Frequency	950 - 1450 MHz
ii)	I.F. Frequency Tune	52 to 88 MHz in 10 KHz step .
iii)	Transponder Tune	Selectable 1 to 24
iv)	No. of channels	Two independent channels

v)	Audio Frequency Response	± 1 dB
vi)	De-emphasis	75 μ
vii)	Line output	+9 dBm max. front panel adjustable.
viii)	Stability factor (Receiver)	PLL System ± 15 KHz.
ix)	Tuning steps	10 KHz, all frequencies
x)	S/N ratio	≥ 65 dB
xi)	Input Impedance	75 Ω
xii)	Audio output Impedance	600 Ω
xiii)	Audio expanding	1 : 2
xiv)	Demodulation	FM
xv)	C/No Threshold	64 dB-Hz.
xvi)	Audio distortion	Less than 1%

8 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	≤ 6 dB
(d)	Input impedance	75 ohm
(e)	Output impedance	75 ohm

DIGITAL RECEIVER (DEMODULATOR + DECODER)

The Digital receiver should conform to the standard and specification of the existing digital radio networking system. The existing digital modulators/ encoders are Radyne Comstream make . So receiver should be compatible with the same.

- i) Input
 - a) Freq. Range 950 - 1450 MHz
 - b) Freq. Tuning Resolution ≤ 25 KHz Local (remote control optional)
 - c) Impedance 75Ω
 - d) Level ≤ -25 to -70 dBm
- ii) Demodulation QPSK (Optional BPSK user selectable)
- iii) Carrier lock range $\geq \pm 500$ KHz
- iv) FEC decoding Rate $\frac{1}{2}$ Viterbi-decoding, sequential-decoding (optional)
(Selectable Rate preferred)
- 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 Balanced, 600Ω
 - b) Level (Maximum) $+ 8$ dBm (adjustable)
 - c) T.H.D. (at 1 KHz) $\leq 0.2\%$ (at $+8$ dbm output at 1kHz)
 - d) Audio signal bandwidth 20 Hz to 20 KHz
 - e) Frequency response ± 1.0 dB (20 Hz to 20 KHz)
 - f) Signal to Noise ratio ≥ 70 dB (referred to $+8$ dbu)
 - g) Dynamic range ≥ 80 dB
 - h) Cross-talk ratio ≥ 75 dB.
 - i) Audio output channels Two mono/one stereo
 - j) Digital Audio output AES / EBU STANDARD (Professional)
- ix) Required Eb/No (B.E.R. $\leq 10^{-5}$) ≥ 5.5 dB(QPSK) , 5 dB (BPSK)
- x) B.E.R. Immunity 1x 10^{-4} for no subjective loss in quality
At 128 kbps, QPSK, vit. rate $\frac{1}{2}$ at

4.5 Eb/No

- xi) Audio Sampling Rate 48 KHz
- xii Stereo Phase deviation Less than 1° for 20 Hz to 10 KHz;
Less than 3° for 10 KHz to 20 KHz.
- xiii) Auxillary data channel
 - a) Data rate ≥ 4.8 Kbps
 - b) Interface RS – 232

1. Specification for L band Amplifier

Features-

The amplifier shall essentially have the following features:

- a) Capable to provide the voltage required for LNBC
- b) Provision for wall mount installation.

S.No		
1.	Frequency of operation	950-1750 MHz
2.	Input level	- 80 to -40 dBm
3.	Input and Output Impedances	75Ω
4.	Input/ Output return loss	≥8dB
5.	Noise figure	≤5 dB
6.	Gain(User adjustable on front panel)	20 to 30dB
7.	Gain flatness(Over entire band)	± 2 dB
8.	Operating voltage(Through centre conductor of the RF cable)	18V to 30 VDC

2. 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 connectors)
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 8Ω.
7. Frequency Response : Better than ± 1 dB
With reference to 1 kHz over
The entire range of 20 Hz to
20 kHz
8. Total Harmonic Distortion : $\leq 0.5\%$ at rated output
at 1 kHz

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|--|---|
| 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 | : < $\pm 10^\circ$, 20 Hz to 20 kHz |
| 14. Inter-channel X-Talk isolation
at 15 kHz | : \geq 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 °C to 45 °C and damp heat conditions up to 40 °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.

LIST OF STORES

S. No.	Items	Qty.
1.	IF to C-Band Up converter	5Nos.
2.	Analog Receiver	30Nos.
3.	LNBC (C Band)	60Nos.
4.	LNBC (S Band)	30Nos.
5.	C Band Combiner(2way)	15Nos.
6.	L Band Power Divider (1:4 Passive)	30Nos.
7.	Dehydrator	10Nos.
8.	Stereo Limiter/ Processor	10Nos.
9.	L-Band Line Amplifier	20Nos.
10.	Stereo Monitoring Amplifier 10 W	10Nos.
11.	Digital receivers	80Nos.

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