

Specification For Satellite Master Antenna Television System (SMATV)

SECTION 1.0 : GENERAL

1.1 System Description

- .1 The specification and drawings are intended to provide a guide for the minimum basic performance and characteristic of the systems required. The system configuration shall be in accordance with the general arrangement shown on the relevant drawings.

1.2 Scope Of Work

- .1 The work covered in this section shall include the design, supply, installation, wiring, testing & commissioning of SMATV system in approved working condition and provide free maintenance thereafter for a period of twelve (12) months.
- .2 The sub-contractor shall design, furnish and install the complete system as specified with all the necessary apparatus and equipment, wiring, etc. required to ensure on completion, a system of professional quality in excellent working order.
- .3 The sub-contractor shall submit detailed calculation and comprehensive layout and wiring diagrams of the SMATV system. The catalogues of all equipment used for this project shall be submitted to the consulting engineer.
- .4 The work to be carried out shall include necessary labour and the whole of the materials necessary for the completion and performance of the system as required, whether such be directly mentioned in the specification or not.

1.3 General Requirement

- .1 The SMATV system shall enable the reception of all local TV channels (RTM1, RTM2, TV3 & NTV7, 8TV & Channel-9), FM radio, ASTRO satellite TV channels and MiTV. (the new pay-TV operator). The system shall also provide one TV channel for the viewing of the visitor picture captured by the CCTV camera at the guard house entrance.
- .2 All required components of the SMATV system shall consist of the satellite dish, antennae, lightning surge protector, channelized headend with channelized amplifiers, power supply unit, distribution amplifiers, splitters, taps, SMATV outlet, coaxial cable and all necessary attenuators, F-connectors & 75 ohm terminal blocks.
- .3 All equipment supplied be modular, easy to install & accessible for maintenance. The distribution equipment must be of F-connector type, saddle & clamp type is not acceptable. The equipment shall comply with the EC (Continental Europe) standard of broadcasting.
- .4 Generally, all the major equipment shall be supplied by one single manufacturer. Before ordering, all equipment must be approved by the consulting engineer.

1.4 List Of Acceptable Manufacturers

1. Philips
2. Fracarro
3. Kathrein
4. Wisi
5. DX Antenna

SECTION 2.0 : SYSTEM PERFORMANCE

2.1 General Performance

- .1 All SMATV equipment, including the coaxial cable, must have the ultra broadband (UBB) frequency bandwidth of 5MHz to 2150MHz. The nominal impedance of all cable, connectors, passive & active components shall be 75Ω.
- .2 The maximum signal level at any point within the SMATV system shall not exceed 110 dB μ V. A derating factor of 8dB shall be applied to all distribution amplifiers for 20 channels operation. Amplifiers are further derated for cascaded operation.
- .3 The system stability shall be such that for a constant aerial input, the signal level at any outlet shall not vary by more than 3dB. The frequency amplitude response of the distribution system shall not vary by more than 1dB over any one channel.
- .4 The carrier to noise ration (CNR) at any SMATV outlet shall have minimum value of 44dB for analogue terrestrial signal and 18dB for digital satellite signal.
- .5 The signal shall be free from 'snow', "ghost" effect & other interference. Cross modulation shall not be visible or audible at any point of the distribution system. The CSO & CTB shall be at least 54dB for analogue terrestrial signal and 30dB for digital satellite signal.

2.2 Signal Level & Characteristics

- .1 Irrespective of system loading, the difference in signal level at the outlet for the weakest and strongest signal shall not exceed 15 dB μ V. The signal output level at any outlet shall be as follow :

Digital TV (ASTRO / MiTV)	: min 55 dB μ V	max 77 dB μ V
Analogue Terrestrial TV	: min 65 dB μ V	max 77 dB μ V
Analogue FM Radio	: min 47 dB μ V	max 66 dB μ V

SECTION 3.0 : ANTENNA SYSTEM**3.1 Antenna System**

- .1 The sub-contractor should carry out necessary site survey to determine the suitable antenna location with the strongest signal strength and to check for possible interference and ghosting.
- .2 The TV antenna system shall consist of one antenna for each TV channel, one FM antenna and 85cm satellite dish for ASTRO reception. The antenna shall be constructed from heavy gauge aluminum or anodized metal to avoid corrosion and rusting.
- .3 The antenna shall be mounted on a hot dipped galvanized steel mast with stay wires to secure it from lateral movement. The mast shall be mounted at a suitable place on the roof and the height should be subject for approval.
- .4 Lightning conductors for the mounting masts shall be installed and connected to the main lightning protection system. Surge protectors shall be installed at all antenna transmission coaxial cable to the headend equipment.

3.2 FM Antenna		Compliance (YES / NO)	Remarks
No. of Element :	2		
Bandwidth (MHz) :	87.5 – 108		
Gain (dB μ V) :	2.1		
Impedance (Ω) :	75		
Wind Load @ 120 km/h (kg) :	3		
Brand / Model :	Fracarro ANT1200A		
3.3 VHF Antenna			
No. of Element :	6		
Bandwidth (MHz) :	174 – 230		
Channel No.	5 – 12		
Gain (dB μ V) :	7.5 – 11		
Impedance (Ω) :	75		
Connection :	F		
Front / Rear Ratio (dB) :	>17		
Wind Load @ 120 km/h (kg) :	4.5		
Brand / Model :	Fracarro BLV6F		

3.4	UHF Antenna		Compliance (YES / NO)	Remarks
	No. of Element :	15		
	Bandwidth (MHz) :	470 - 862		
	Channel No.	21- 69		
	Gain (dB μ V) :	8 - 12		
	Impedance (Ω) :	75		
	Connection :	F		
	Front / Real Ratio (dB) :	>22		
	Wind Load @ 120 km/h (kg) :	2.8		
	Brand / Model :	Fracarro TAU15/45		
	3.5 Satellite Dish & LNB			
	Diameter (cm) :	90		
	Reflector Material :	Steel		
	Optics ($^{\circ}$) :	21.5 offset		
	LO Frequency (GHz) :	9.75		
	Noise Temperature ($^{\circ}$ K) :	35		
	Cross Polarization (dB) :	>26		
	Brand / Model :	JONSA DSD90		
	3.6 Lightning Surge Arrestor			
	Bandwidth (MHz) :	5 - 2050		
	Impedance (Ω) :	75		
	Insertion Loss (dB μ V) :	1.3		
	Insulation Resistance (M Ω) :	10,000		
	Brand / Model :	SATCOM S642I		

SECTION 4.0 : HEADEND SYSTEM**4.1 Headend Equipment**

- .1 The headend shall be modularized with provision for additional channels in the future. It should generally consist of channelized amplifier, headend amplifier, satellite amplifier, FM amplifier, converter, power supply unit, mounting kit and headend cabinet.

4.2 VHF Channelized Amplifier		Compliance (YES / NO)	Remarks
Bandwidth (MHz) :	47 - 230		
Channel No. :	5 – 12		
Gain (dBμV) :	45		
Gain Adjustment (dBμV) :	40		
Output Level (dBμV) :	120		
Noise Figure (dBμV) :	9		
Flatness (dB) :	1		
Insertion Loss (dBμV) :	0.5		
Impedance (Ω) :	75		
Power Supply (V) :	12		
Power Consumption (mA) :	180		
Brand / Model :	Fracarro K-Series K120/**		
4.3 UHF Channelized Amplifier			
Bandwidth (MHz) :	470- 862		
Channel No. :	21 – 69		
Gain (dBμV) :	45		
Gain Adjustment (dBμV) :	30		
Output Level (dBμV) :	120		
Noise Figure (dBμV) :	9		
Flatness (dB) :	1		
Insertion Loss (dBμV) :	0.5		
Impedance (Ω) :	75		
Power Supply (V) :	12		
Power Consumption (mA) :	200		
Brand / Model :	Fracarro K-Series K120/**		

4.4	FM Channelized Amplifier		Compliance (YES / NO)	Remarks
	Bandwidth (MHz) :	87.5 - 108		
	Gain (dB μ V) :	40		
	Output Level (dB μ V) :	112		
	Noise Figure (dB μ V) :	5		
	Flatness (dB) :	3		
	Insertion Loss (dB μ V) :	0.5		
	Impedance (Ω) :	75		
	Power Supply (V) :	12		
	Power Consumption (mA) :	200		
	Brand / Model :	Fracarro K-Series K120/FM		
4.5	Headend Power Supply			
	Input Voltage (VAC) :	220 – 230		
	Output Voltage (VDC) :	12		
	Current Rating (A) :	3.5		
	Power Consumption (W) :	55		
	Brand / Model :	Fracarro K-Series KP35		
4.6	Headend Launch Amplifier			
	Bandwidth (MHz) :	47 - 862		
	Gain (dB μ V) :	44		
	Gain Adjustment (dB μ V) :	20		
	Output Level (dB μ V) :	121		
	Noise Figure (dB μ V) :	8		
	Impedance (Ω) :	75		
	Power Supply (V) :	12		
	Power Consumption (mA) :	550		
	Brand / Model :	Fracarro K-Series KW33B		

4.7	Headend SAT IF Amplifier		Compliance (YES / NO)	Remarks
	Bandwidth (MHz) :	950 - 2150		
	Gain (dB μ V) :	38 - 44		
	Gain Adjustment (dB μ V) :	20		
	Output Level (dB μ V) :	125		
	Noise Figure (dB μ V) :	6		
	Impedance (Ω) :	75		
	Power Supply (V) :	12		
	Power Consumption (mA) :	310		
	Brand / Model :	Fracarro K-Series KX125E		
4.8	Modulator			
	Type	CVBS		
	Filter Type :	Double SAW Filters		
	Bandwidth (MHz) :	47 - 862		
	Channel No. :	5 - 69		
	Output Level (dB μ V) :	90		
	C/N (dB) :	65		
	Video Input Level (Vpp) :	1		
	Audio Input Level (mV RMS) :	Stereo 500		
	Video Impedance (Ω) :	75		
	Power Supply (V) :	12		
	Power Consumption (mA) :	500		
	Brand / Model :	Fracarro K-Series KMS		

SECTION 5.0 : DISTRIBUTION SYSTEM**5.1 Distribution System**

- .1 The distribution system shall consist of distribution amplifier, splitter, taps, wall outlet and coaxial cable. All the SMATV components and coaxial cable must have the frequency bandwidth of 5 – 2150MHz. The distribution equipment must be of F-connector type, saddle & clamp type is not acceptable. The last tap and spare splitter should be terminated with 75 ohm load.

5.2	RF Distribution Amplifier	Compliance	Remarks
		(YES / NO)	
	Bandwidth (MHz) :	5 - 862	
	Power Supply (V) :	187 - 264	
	Power Consumption (W) :	9	
	Impedance (Ω) :	75	
	Gain (dB μ V) :	40	
	Output Level (dB μ V) :	118	
	Level Adjustment (dB μ V) :	0 - 20	
	Slop Adjustment (dB μ V) :	0 - 20	
	Noise Figure (dB μ V) :	9	
	Brand / Model :	Fracarro AMP9762	
5.3	SAT IF Distribution Amplifier		
	Bandwidth (MHz) :	950 - 2150	
	Power Supply (V) :	187 - 264	
	Power Consumption (W) :	11	
	Impedance (Ω) :	75	
	Gain (dB μ V) :	40	
	Output Level (dB μ V) :	125	
	Level Adjustment (dB μ V) :	0 - 20	
	Slop Adjustment (dB μ V) :	0 - 20	
	Noise Figure (dB μ V) :	10	
	Brand / Model :	Fracarro AMP9764	

5.4	UBB Distribution Amplifier	Compliance (YES / NO)	Remarks
	Bandwidth (MHz) :	5 - 2150	
	Power Supply (V) :	187 - 264	
	Power Consumption (W) :	16	
	Impedance (Ω) :	75	
	<u>Satellite :</u>		
	Gain (dB μ V) :	40	
	Output Level (dB μ V) :	125	
	Level Adjustment (dB μ V) :	0 - 20	
	Slop Adjustment (dB μ V) :	0 - 20	
	Noise Figure (dB μ V) :	10	
	<u>Terrestrial TV :</u>		
	Gain (dB μ V) :	40	
	Output Level (dB μ V) :	118	
	Level Adjustment (dB μ V) :	0 - 20	
	Slop Adjustment (dB μ V) :	0 - 20	
	Noise Figure (dB μ V) :	9	
	Brand / Model :	Fracarro AMP9763	
5.5	RF Splitter		
	Type :	2-ways	
	Bandwidth (MHz) :	5 - 862	
	Impedance (Ω) :	75	
	Connectors :	F	
	Insertion Loss (dB μ V) :	3.6	
	Isolation (dB μ V) :	20	
	Brand / Model :	Fracarro PAS1222/011	
	Type :	3-ways	
	Bandwidth (MHz) :	5 - 862	
	Impedance (Ω) :	75	
	Connectors :	F	
	Insertion Loss (dB μ V) :	5.6	
	Isolation (dB μ V) :	18	
	Brand / Model :	Fracarro PAS1232/011	

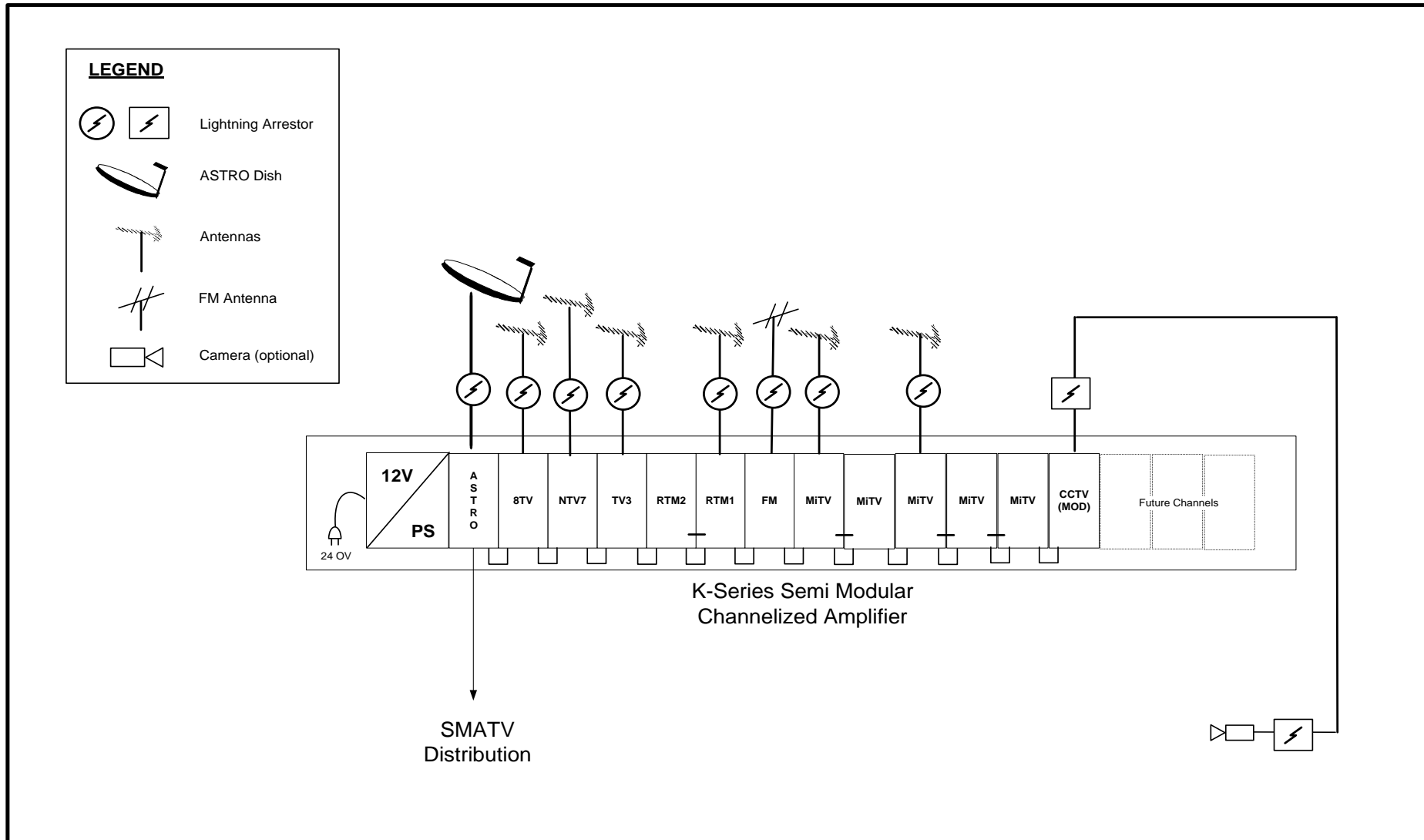
			Compliance (YES / NO)	Remarks
Type :	4-ways			
Bandwidth (MHz) :	5 - 862			
Impedance (Ω) :	75			
Connectors :	F			
Insertion Loss (dB μ V) :	7.5			
Isolation (dB μ V) :	16			
Brand / Model :	Fracarro PAS1242/011			
5.6 UBB Splitter				
Type :	2-ways			
Bandwidth (MHz) :	5 - 2300			
Impedance (Ω) :	75			
Connectors :	F			
<u>Insertion Loss</u>				
SAT IF (dB μ V) :	4.5			
TV RF (dB μ V) :	4			
<u>Isolation</u>				
SAT IF (dB μ V) :	17			
TV RF (dB μ V) :	25			
Brand / Model :	Fracarro SPT2			
Type :	3-ways			
Bandwidth (MHz) :	5 - 2300			
Impedance (Ω) :	75			
Connectors :	F			
<u>Insertion Loss</u>				
SAT IF (dB μ V) :	9.5			
TV RF (dB μ V) :	6.5			
<u>Isolation</u>				
SAT IF (dB μ V) :	16			
TV RF (dB μ V) :	20			
Brand / Model :	Fracarro SPT3			

			Compliance (YES / NO)	Remarks
Type :	4-ways			
Bandwidth (MHz) :	5 - 2300			
Impedance (Ω) :	75			
Connectors :	F			
<u>Insertion Loss</u>				
SAT IF (dB μ V) :	10			
TV RF (dB μ V) :	8			
<u>Isolation</u>				
SAT IF (dB μ V) :	15			
TV RF (dB μ V) :	25			
Brand / Model :	Fracarro SPT4			
Type :	6-ways			
Bandwidth (MHz) :	5 - 2300			
Impedance (Ω) :	75			
Connectors :	F			
<u>Insertion Loss</u>				
SAT IF (dB μ V) :	14			
TV RF (dB μ V) :	10			
<u>Isolation</u>				
SAT IF (dB μ V) :	15			
TV RF (dB μ V) :	20			
Brand / Model :	Fracarro SPT6			
5.7 RF Taps (Directional Coupler)				
Type :	2-ways			
Bandwidth (MHz) :	5 - 862			
Impedance (Ω) :	75			
Connectors :	F			
Tap Loss (dB μ V) :	8.5 / 12.5 / 16			
Insertion Loss (dB μ V) :	3.8 / 1.5 / 1.5			
Isolation (dB μ V) :	16 / 22 / 22			
Brand / Model :	Fracarro PAS2222/*11			

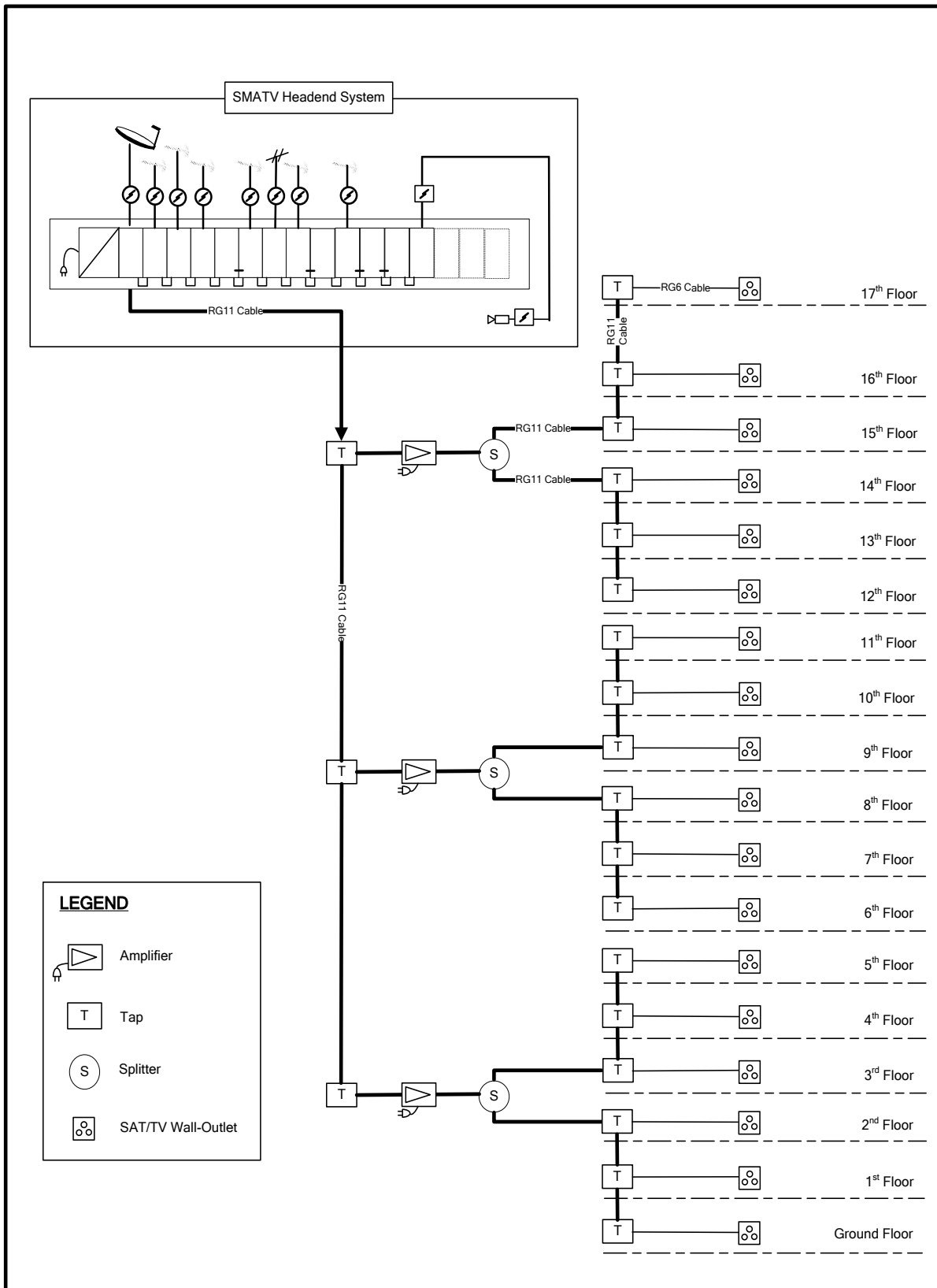
			Compliance (YES / NO)	Remarks
Type :	4-ways			
Bandwidth (MHz) :	5 - 862			
Impedance (Ω) :	75			
Connectors :	F			
Tap Loss (dB μ V) :	13 / 17 / 21			
Insertion Loss (dB μ V) :	4.5 / 2.5 / 2.5			
Isolation (dB μ V) :	22 / 22 / 26			
Brand / Model :	Fracarro PAS2242/*11			
5.8 UBB Taps (Directional Coupler)				
Type :	2-ways			
Bandwidth (MHz) :	5 - 2300			
Impedance (Ω) :	75			
Connectors :	F			
<u>Tap Loss</u>				
SAT IF (dB μ V) :	11 / 15 / 20			
TV RF (dB μ V) :	11 / 15 / 20			
<u>Insertion Loss</u>				
SAT IF (dB μ V) :	4.8 / 4 / 4			
TV RF (dB μ V) :	3.6 / 2.5 / 2.5			
<u>Isolation</u>				
SAT IF (dB μ V) :	20 / 23 / 25			
TV RF (dB μ V) :	30 / 30 / 30			
Brand / Model :	Fracarro TA2			
Type :	4-ways			
Bandwidth (MHz) :	5 - 2300			
Impedance (Ω) :	75			
Connectors :	F			
<u>Tap Loss</u>				
SAT IF (dB μ V) :	13 / 16 / 21			
TV RF (dB μ V) :	11 / 16 / 21			
<u>Insertion Loss</u>				
SAT IF (dB μ V) :	6.5 / 5.5 / 4.5			
TV RF (dB μ V) :	5 / 4 / 3			
<u>Isolation</u>				
SAT IF (dB μ V) :	16 / 16 / 16			
TV RF (dB μ V) :	18 / 20 / 20			
Brand / Model :	Fracarro TA4			

		Compliance (YES / NO)	Remarks
Type :	6-ways		
Bandwidth (MHz) :	5 - 2300		
Impedance (Ω) :	75		
Connectors :	F		
<u>Tap Loss</u>			
SAT IF (dB μ V) :	19 / 21.5 / 26		
TV RF (dB μ V) :	17 / 20.5 / 25		
<u>Insertion Loss</u>			
SAT IF (dB μ V) :	8 / 4.5 / 4.5		
TV RF (dB μ V) :	4 / 3.3 / 2.7		
<u>Isolation</u>			
SAT IF (dB μ V) :	13 / 13 / 17		
TV RF (dB μ V) :	20 / 20 / 25		
Brand / Model :	Fracarro TA6		
5.9 SAT/TV/FM Wall-Outlet			
<u>Output Bandwidth</u>			
SAT IF (MHz) :	950 –2300		
TV RF (MHz) :	5 – 68 / 120 – 862		
Radio FM (MHz) :	88 - 108		
<u>Insertion Loss</u>			
SAT IF (dB μ V) :	2		
TV RF (dB μ V) :	1.5		
Radio FM (dB μ V) :	2		
Dimension (mm)	86 x 86 x 9mm (UK Size)		
Brand / Model :	Fracarro PAS0032		

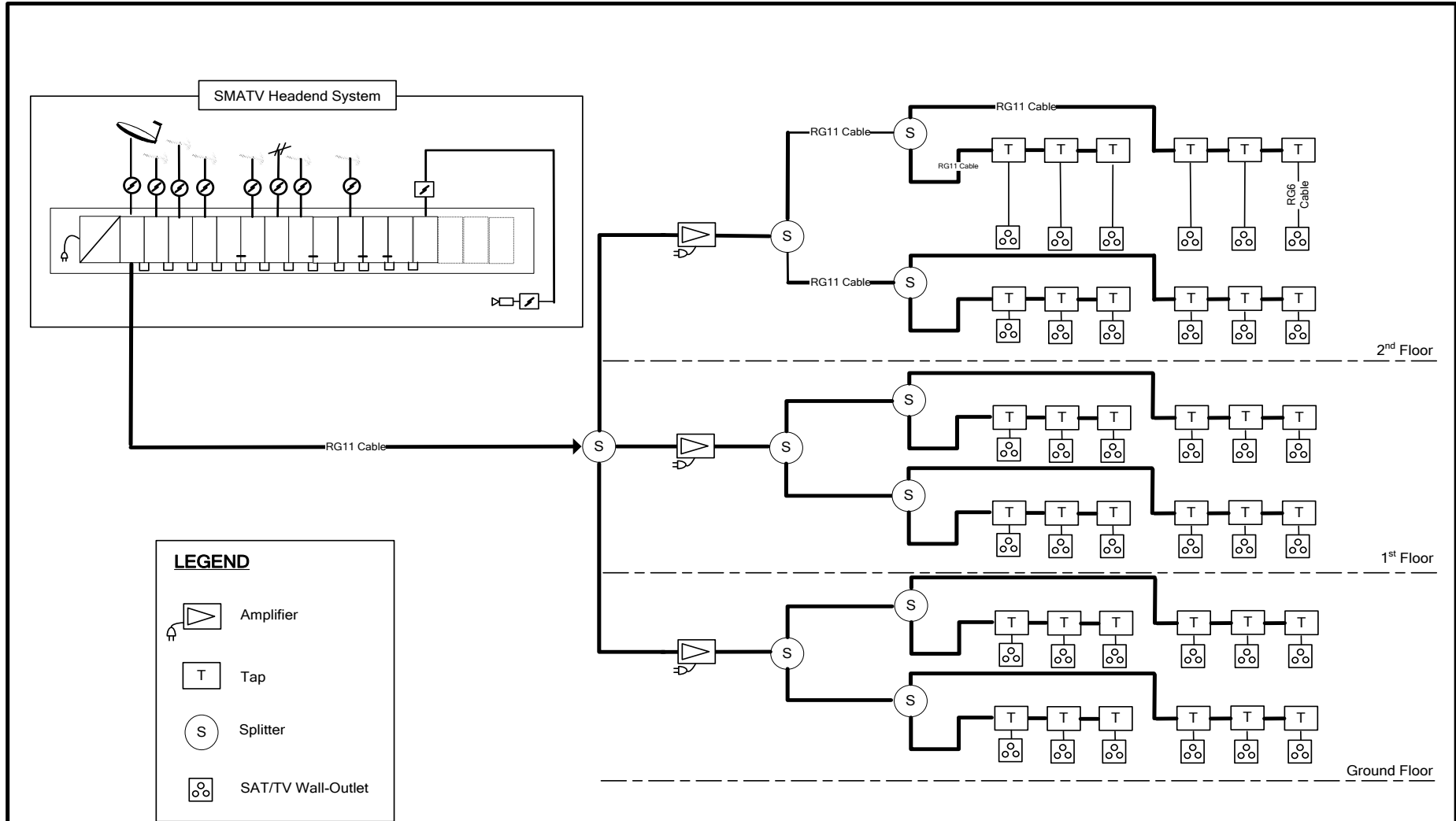
5.10	SMATV Coaxial Cable		Compliance (YES / NO)	Remarks
	Type :	RG-6		
	Bandwidth (MHz) :	5 - 3000		
	Impedance (Ω) :	75		
	Braid Coverage (%) :	<60		
	Inner Conductor :	Solid CCS		
	Diameter Over Sheath (mm) :	6.9		
	<u>Max Signal Loss / 100m</u>			
	@ 55 MHz (dB) :	5.25		
	@ 250 MHz (dB) :	10.82		
	@ 450 MHz (dB) :	14.44		
	@ 865 MHz (dB) :	20.01		
	@ 1000 MHz (dB) :	21.49		
	@ 1450 MHz (dB) :	25.82		
	@ 1800 MHz (dB) :	28.77		
	@ 2200 MHz (dB) :	31.75		
	@ 2800 MHz (dB) :	35.76		
	@ 3000 MHz (dB) :	37.01		
	Brand / Model :	COMMSCOPE SAT660BV		
	Type :	RG-11		
	Bandwidth (MHz) :	5 - 3000		
	Impedance (Ω) :	75		
	Braid Coverage (%) :	<60		
	Inner Conductor :	Solid CCS		
	Diameter Over Sheath (mm) :	10.3		
	<u>Max Signal Loss / 100m</u>			
	@ 55 MHz (dB) :	3.15		
	@ 250 MHz (dB) :	6.72		
	@ 450 MHz (dB) :	9.02		
	@ 865 MHz (dB) :	13.05		
	@ 1000 MHz (dB) :	14.27		
	@ 1450 MHz (dB) :	17.39		
	@ 1800 MHz (dB) :	19.69		
	@ 2200 MHz (dB) :	22.14		
	@ 2800 MHz (dB) :	25.53		
	@ 3000 MHz (dB) :	26.60		
	Brand / Model :	COMMSCOPE SAT1160BV		







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<p>Tel : 603-8061 0659 Fax : 603-8062 2908 Email : scn@tm.net.my</p>	Project :	Typical Vertical Building	
	Description :	SMATV System	
	Requested By :		Designed By :
	Filename :	\\d_rina\Catalogues\Tender Specification\SMATV Diagram	Revision :



LEGEND

-  Amplifier
-  Tap
-  Splitter
-  SAT/TV Wall-Outlet

SATCOMNET
 SYSTEMS SDN BHD
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Project :	Typical Horizontal Building		
Description :	SMATV Headend Diagram		
Requested By :		Designed By :	
Filename :	\\d_rina\Catalogues\Tender Specification\SMATV Diagram	Revision :	2