TECHNICAL CODE

SPECIFICATION FOR
DIRECT-TO-HOME (DTH) SATELLITE BROADCAST RECEIVING
ANTENNA

Developed by

Registered by

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DEVELOPMENT OF TECHNICAL CODES

The Communications and Multimedia Act 1998 (‘the Act’) provides for Technical Standards Forum designated under section 184 of the Act or the Malaysian Communications and Multimedia Commission (‘the Commission’) to prepare a technical code. The technical code prepared pursuant to section 185 of the Act shall consist of, at least, the requirement for network interoperability and the promotion of safety of network facilities.

Section 96 of the Act also provides for the Commission to determine a technical code in accordance with section 55 of the Act if the technical code is not developed under an applicable provision of the Act and it is unlikely to be developed by the Technical Standards Forum within a reasonable time.

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A technical code prepared in accordance with section 185 shall not be effective until it is registered by the Commission pursuant to section 95 of the Act.

For further information on the technical code, please contact:

Malaysian Communications and Multimedia Commission (SKMM)
Off Pesiaran Multimedia
63000 Cyberjaya
Selangor Darul Ehsan
MALAYSIA

Tel: +60 3 8688 8000
Fax: +60 3 8688 1000
http://www.skmm.gov.my

OR

Malaysian Technical Standards Forum Bhd (MTSFB)
L2-E-11, Lab 3, Digital Media Centre
Enterprise 4
Technology Park Malaysia
Lebuhraya Puchong –Sg Besi
Bukit Jalil
57000 Kuala Lumpur
MALAYSIA

Tel: +60 3 8996 5505/5509
Fax: +60 3 8996 5507
http://www.mtsfb.org.my
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Committee Representation

The Satellite Broadcast Terminal Working Group under the Malaysian Technical Standards Forum Bhd (MTSFB) which developed this Technical Code consists of representatives from the following organisations:

- Jaring Communications Sdn Bhd
- Measat Broadcast Network Systems Sdn Bhd (ASTRO)
- Packet One Networks (Malaysia) Sdn Bhd
- SIRIM QAS International Sdn Bhd.
- Telekom Malaysia Berhad
- YP Yau Trading
FOREWORD

This technical code for the Specification for Direct-to-Home (DTH) Satellite Broadcast Receiving Antenna (‘this Technical Code’) was developed pursuant to section 185 of the Act 588 by the Malaysian Technical Standard Forum Berhad (‘MTSFB’) via its Satellite Broadcast Terminal Working Group.

This Technical Code was developed for the purpose of certifying communications equipment under the Communications and Multimedia (Technical Standards) Regulations 2000.

This Technical Code cancels and replaces the Technical Specification for Satellite Receiving Station - Satellite Broadcast Antenna, RPS 004-01, which was previously saved under Section 275, CMA 1998.

This Technical Code shall continue to be valid and effective until reviewed or cancelled.
SPECIFICATION FOR DIRECT-TO-HOME (DTH) SATELLITE BROADCAST RECEIVING ANTENNA

1. Scope

This Technical Standard defines the minimum technical requirements of Direct-to-Home (DTH) Satellite Receiving Antenna (SRA) for Ku-band reception.

The SRA consists of the following main components:

1. Satellite Dish
2. Feed horn
3. Low Noise Block Down converter (LNB)
4. LNB Arm
5. Cable
6. Antenna Mount

The SRA components are illustrated in Annex A.

The SRA must provide the correct interface to the Direct-to-Home Satellite Receiver (DTH Set-Top Box). This Technical Standard only defines the SRA and interface requirements between the SRA and the STB.

2. Normative References

The following normative references are indispensable for the application of this Technical Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 6500  Electric cables Flexible cords rated up to 300/500 V, for use with appliances and equipment intended for domestic, office and similar environments
BS EN 50075  Specification for flat non-rewirable two-pole plugs 2.5A 250V, with cord, for the connection of class II-equipment for household and similar purposes
IEC 1114-2  Methods of measurement on Receiving Antennas for Satellite Broadcast Transmission in the 11/12 GHz band – Part 2: Mechanical and environmental test on individual and collecting receiving antennas
IEC 60227-5  Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 5: Flexible cables (cords)
IEC 60245-4  Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 4: Cords and flexible cables
MS 140  Specification for insulated flexible cords and cables
MS 406  Specification for voltages and frequency for alternating current transmission and

1
3. Abbreviations

DTH  Direct to Home
SRA  Satellite Receiving Antenna
LNB  Low Noise Block Down converter
MS   Malaysian Standard
IEC  International Electrotechnical Commission
STB  Set-Top Box
DVB  Digital Video Broadcasting

4. Requirements

4.1 General Requirement

4.1.1 Power Supply Requirements

The Low Noise Block Down converter (LNB) shall be powered by the satellite receiver or alternatively can be powered via external power adaptor. The external power supply may be AC or DC powered. For AC powered equipment, the operating voltage shall be 240 V ±5 %, -10 % and frequency 50 Hz ± 1 % as according to MS 406 or 230 V ± 10 % and frequency 50 Hz ± 1 % as according to MS IEC 60038 whichever is current.

Where an external power supply is used, e.g. AC adaptor, it shall not affect the capability of the equipment to comply with this specification. Adaptor must be pre-approved by the relevant regulatory body before it can be used with the equipment.
4.1.2 Power Supply Cord and Mains Plug

If the external power supply is used, the equipment shall be fitted with a suitable and appropriate approved power supply cord and mains plug. Both are regulated products and must be pre-approved by the relevant regulatory body before it can be used with the equipment.

The power supply cord shall be certified in accordance to:

- a) MS 140;
- b) BS 6500;
- c) IEC 60227-5; or
- d) IEC 60245-4.

The main plug shall be certified according to:

- a) 13 A fused plugs: MS 589: Part 1 or BS 1363: Part 1; or
- b) 2.5 A, 250 V, flat non-rewirable two-pole plugs: MS 1578 or BS EN 50075.

4.1.3 Marking Requirements

The antenna system and/or its component shall be marked with the following information:

- a) supplier/manufacturer’s name or identification mark;
- b) supplier/manufacturer’s model or type reference; and
- c) other markings as required by the relevant standards referred in this document

The markings shall be legible, indelible and readily visible. All information on the marking shall be either in Bahasa Melayu or English Language.

4.2 Technical Requirement

The inputs to the SRA shall be in the range from 10.7 GHz to 12.75 GHz designated for broadcasting satellite service provided by a licensee in the country. Each RF carrier is either using DVB-S or DVB-S2 satellite transmission standard and is an aggregate of multiple digital video, audio, and data channels. The outputs of the SRA are L-Band composite carriers in the frequency range 950 MHz to 2150 MHz.

4.2.1 Antenna

The antenna shall be the standard off-set antenna.

The antenna shall meet the following performance specifications as per Table 1:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satellite Dish Size</td>
<td>60 cm -120 cm (diameter)</td>
</tr>
<tr>
<td>Operational Wind Speed</td>
<td>72 km/hr (max)</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival wind speed</td>
<td>144 km/hr (max)</td>
</tr>
<tr>
<td>Output level</td>
<td>-20 dBm to -65 dBm at SBR input port, each carrier</td>
</tr>
<tr>
<td>Cable</td>
<td>RG-6F equivalent cable between LNB and SBR</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0 °C to 50 °C operating, -40 °C to +55 °C non-operating</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>95% non-condensing</td>
</tr>
<tr>
<td>Gain</td>
<td>at Min 36 dBi at 11.2 GHz (for 60cm)</td>
</tr>
<tr>
<td>Beam width</td>
<td>2.6 ° at 3 dB points</td>
</tr>
<tr>
<td>Side lobes</td>
<td>5 ° to 20 °; G=29 - 25 log θ dB or less. 20 ° to 48 °; G=32 - 25 log θ dB or less. 48 ° to 180 °; G=10 dB or less.</td>
</tr>
<tr>
<td>Noise temperature</td>
<td>35 °K (max)</td>
</tr>
<tr>
<td>Cross polarization isolation</td>
<td>30 dB (min)</td>
</tr>
<tr>
<td>Offset angle</td>
<td>25 °</td>
</tr>
<tr>
<td>Altitude (optional)</td>
<td>6500 m</td>
</tr>
</tbody>
</table>

### 4.2.2 Feed horn

The Feed horn shall be designed to provide for mounting to the antenna in an off-set mechanical configuration, and to mount directly to the LNB. The Feed horn shall be capable of receiving both horizontal and vertical polarised signals in the frequency range 10.7 GHz to 12.75 GHz. The Feed horn shall have less than 0.2 dB insertion loss.

### 4.2.3 Low Noise Block Down converter (LNB)

The LNB shall meet the following performance specifications as per Table 2:

**Table 2. Performance Specifications for LNB**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input frequencies range</td>
<td>10.7 GHz - 12.75 GHz</td>
</tr>
<tr>
<td>Polarization</td>
<td>Linear</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>Vertical Polarization - 9 to 14 volts</td>
</tr>
</tbody>
</table>
## Parameter Specification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal Polarization</td>
<td>16 to 20 volts</td>
</tr>
<tr>
<td>Insertion loss</td>
<td>&lt;0.2 dB</td>
</tr>
<tr>
<td>Cross polarization</td>
<td>20 dB Min</td>
</tr>
<tr>
<td>Local oscillator (LO)</td>
<td>For Non Universal LNB 9 GHz to 11.8 GHz</td>
</tr>
<tr>
<td></td>
<td>For Universal LNB Dual LO: 9.75 GHz &amp; 10.6 GHz</td>
</tr>
<tr>
<td>Local oscillator switching</td>
<td>Should support 22KHz tone switching for dual band LO.</td>
</tr>
<tr>
<td>Noise figure</td>
<td>0.5 dB to 0.8 dB</td>
</tr>
<tr>
<td>Phase noise</td>
<td>-55 dBC/Hz @ 100Hz</td>
</tr>
<tr>
<td></td>
<td>-65 dBC/Hz @ 1KHz</td>
</tr>
<tr>
<td></td>
<td>-80 dBC/Hz @ 10KHz</td>
</tr>
<tr>
<td></td>
<td>-95 dBC/Hz @ 100KHz</td>
</tr>
<tr>
<td></td>
<td>-105 dBC/Hz @ 1 MHz</td>
</tr>
<tr>
<td>Gain</td>
<td>55 dB to 65 dB</td>
</tr>
<tr>
<td>Gain variation</td>
<td>Less than +/- 0.5 dB over any 36 MHz bandwidth.</td>
</tr>
<tr>
<td>Third order intermodulation</td>
<td>Less than -50 dBC with two equal tones of -25 dBm each at the output</td>
</tr>
<tr>
<td>Image rejection</td>
<td>40 dBC Minimum</td>
</tr>
<tr>
<td>Output VSWR</td>
<td>2.0:1 Typical, 75 Ohm</td>
</tr>
<tr>
<td>LO frequency stability 9.75 GHz</td>
<td>± 3MHz Max over a temperature range of -20 °C to +60 °C</td>
</tr>
<tr>
<td>LO frequency stability 10.60 GHz</td>
<td>± 3MHz Max over a temperature range of -20 °C to +60 °C</td>
</tr>
<tr>
<td>Output connector</td>
<td>Type F, 75 Ohm female</td>
</tr>
<tr>
<td>Output return loss</td>
<td>9.6 dB maximum</td>
</tr>
</tbody>
</table>

The use of dual LNB (dual output), Quattro and quad LNB (quadruple output) shall be possible provided each output of such dual and quad LNB shall meet the specification stated above.

The use of optical LNB shall be possible provided the converted output shall meet the specification stated above.
4.2.4 Antenna Mounting

A universal antenna mount shall be provided with the SRA.

This universal mount should allow the subscriber or qualified installer to mount the antenna onto wall (vertical) and terrace (horizontal) mounting surface and any in between surface angles.

The universal mount construction should be stable and secure. The mounting base should consist of at least 4 mounting holes distributed evenly for installation and sufficient holes in the centre to allow for heat expansion. The universal mount and all necessary hardware supplied should be galvanized to protect against rusting.

The mount shall not corrode when subjected to salt spray per UNI ISO 9227 for 500 hours, and shall not sustain the growth of fungus.

The mechanical and environmental characteristic shall be compliant to IEC 1114-2.

The Wall Mount Configuration and Universal Foot are illustrated in Annex B.

4.2.4.1 Adjusting Bracket

The adjusting bracket shall have elevation and azimuth scales, marked in degrees, which will allow the adjustment of the antenna over a +/- 10° range in elevation and azimuth to an accuracy of 0.5°. The pointing accuracy shall be maintained within 1° under all operating conditions.

4.2.5 Cabling

Coaxial Cable required to interconnect the SRA to the satellite receiver shall be RG-6 type or equivalent. It shall be provided with type F male connectors.

The impedance of the cable must be 75 Ohm. The performance of the cable shall comply with the attenuation characteristic in Table 3 below.

<table>
<thead>
<tr>
<th>MHz</th>
<th>dB/100m</th>
</tr>
</thead>
<tbody>
<tr>
<td>860</td>
<td>18.5</td>
</tr>
<tr>
<td>1000</td>
<td>21.1</td>
</tr>
<tr>
<td>1350</td>
<td>23.8</td>
</tr>
<tr>
<td>1750</td>
<td>28.0</td>
</tr>
<tr>
<td>2150</td>
<td>31.4</td>
</tr>
</tbody>
</table>

The supplied F male - connector should be screw type with O-ring to protect against rainwater and moisture. LNB arm should have means to secure the cable to the arm.
Components of Satellite Receiving Antenna (SRA):;
1. Satellite Dish
2. Feed horn
3. LNB
4. LNB Arm
5. 75 Ohm Cable
6. Antenna Mount
Annex B

Figure 2. Example of Wall Mount Configuration

Figure 3. Example of Universal Foot
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Acknowledgement

Members of the Satellite Broadcast Terminal Working Group:

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shahrul Imran Sultan (Chairman)</td>
<td>Measat Broadcast Network Systems Sdn Bhd (ASTRO)</td>
</tr>
<tr>
<td>Zul Deresid (Vice Chairman)</td>
<td>Measat Broadcast Network Systems Sdn Bhd (ASTRO)</td>
</tr>
<tr>
<td>Razaini Mohd Razali (Secretary)</td>
<td>SIRIM QAS International Sdn Bhd</td>
</tr>
<tr>
<td>Ir Shaharudin Mohd Sharifudin</td>
<td>Jaring Communications Sdn Bhd</td>
</tr>
<tr>
<td>Mohd Hilal Hassan</td>
<td>Jaring Communications Sdn Bhd</td>
</tr>
<tr>
<td>Norlila Abu Bakar</td>
<td>Jaring Communications Sdn Bhd</td>
</tr>
<tr>
<td>Mustafa Kamal</td>
<td>Measat Broadcast Network Systems Sdn Bhd (ASTRO)</td>
</tr>
<tr>
<td>Prakash Maniam</td>
<td>Measat Broadcast Network Systems Sdn Bhd (ASTRO)</td>
</tr>
<tr>
<td>Syed Ahmad Anas Syed Omar</td>
<td>Packet One Networks (Malaysia) Sdn Bhd</td>
</tr>
<tr>
<td>Mohd Isa Razhali</td>
<td>SIRIM QAS International Sdn Bhd</td>
</tr>
<tr>
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