

# PROCEDURE FOR CERTIFICATION/TECHNICAL EMPANELMENT OF TABLET MANUFACTURERS FOR DGS&D RATE CONTRACT

In the procedure for the supplies of the Aakash Tablet it is envisaged that the Tablet manufacturers comply with the minimal specifications as published by the Government. C-DAC has been entrusted with the responsibility with the testing and certification of the Tablets. Only those who are certified by C-DAC will be permitted to use the Aakash Tablet logo.

The following procedure is being adopted for this purpose.

There will be two testing procedures.

## 1. Pre-qualification testing

Before the vendor is authorized to use the Aakash Tablet logo, the testing shall be carried out for the adherence of the specifications and a report shall be provided to the manufacturer. Once a vendor is authorized to use the Aakash Tablet logo, the validity of the certification will be for three years subject to compliance to acceptance tests yearly. Manufacturer may do the certification exercise for similar models or new models.

The specific model as submitted will be certified based on the adherence to the specifications. A manufacturer who makes multiple models even when the model might look similar physically will be permitted to use the Aakash Tablet logo only for the certified models and for no other model.

The pre-qualification testing will be carried out by C-DAC or by STQC on behalf of C-DAC. Manufacturer to pay the certification fee for this purpose to C-DAC in advance.

## 2. Sample testing

When the manufacturer is provided with an order of certain quantities of Aakash Tablet, acceptance test will be conducted as per approved procedure. The acceptance test will be done on randomly selected samples out of the manufactured lot.

This document only specifies the pre-qualification testing procedure.

## SUBMISSION OF SAMPLES

The manufacturers should supply eight samples of the Tablet model to C-DAC. All Tablets should be of the same model and to be provided in the finished product form with all applications pre-installed. Along with the Tablet model, the following shall also be supplied to C-DAC. For certification samples submitted should pass all tests.

1. List of serial numbers and MAC IDs of the Tablets.
2. Service manual/user's manual etc. for the Tablet.
3. Each Tablet endorsed physically by authorized person from the manufacturer through non-erasable marking pen with a clearly displayed serial number.
4. The manufacturers must provide full specification and datasheets of the Tablet.

## TIME DURATION AND TEST PROCEDURE

C-DAC will scrutinize the supplied samples and will provide an acceptance receipt for the Tablets once all the Tablets/documents etc. are received. Once the Tablets have been accepted, C-DAC will take 15-20 working days for the testing procedures and will provide the test report at the end of the testing procedure. If the model is tested and found to be compliant to the Aakash specifications, C-DAC will provide an authorized certificate for the use of Aakash Tablet logo. If the model is not found to be meeting the specifications, the test report will provide the details on the failures of the specifications.

Certain tests need to be done by the manufactures on their own. A valid self certificate for those tests will be acceptable. For these tests, the manufacturer should provide the test reports if applicable.

The following test procedure will be carried out.

SI No	Tests vis-a-vis specifications		Remarks
<b>1</b>	<b>Hardware</b>		
1.1	Processor Performance Specification as per <b>Appendix-A</b> of specifications		
1.2	Hardware accelerator for playing true HD720p with at least 30fps		
1.3	Hardware accelerator supporting OpenGL ES 2.0. Hardware accelerator performance as per specification given in <b>Appendix-A</b>		
1.4	<b>Memory (RAM):</b> 1 GB LPDDR2/DDR3 SDRAM 1066 MT/S		
1.5	<b>Storage (Internal):</b> 4 GB with integrated flash		
1.6	<b>Storage (External):</b> Micro SD Card 2.0 Interface up to 32GB.		
1.7	<b>USB Interfaces:</b> Configuration (A), (B) or (C). External powered/non-powered hub will be		Manufacturer to provide name of USB port

		tested.	manufacturers and quality certificate.
		1.7.1	The powered USB port must be able to source up to 500mA current to attached devices
		1.7.2	<p>Support for the following external devices</p> <ol style="list-style-type: none"> <li>1. USB Storage Device</li> <li>2. Keyboard</li> <li>3. Mouse</li> <li>4. USB Hub</li> <li>5. All popular 2G/3G Phone / Data Connectivity Dongles in India (Tata Photon, Airtel, Reliance 3G, Idea, Samsung Galaxy Series, Apple iPhone 4 and above, Nokia Lumia)</li> <li>6. USB to Ethernet adaptors</li> <li>7. USB Printers</li> </ol> <p>For 2G/3G Dongles, the manufacturers to provide the model details for each of the supported manufacturer (Tata Photon, Airtel, Reliance, Idea). The phone model may also be provided for Galaxy, iPhone and Lumia.</p>
	1.8	USB and SD card should work simultaneously and support file browsing	
	1.9	USB to support USB mouse and USB keyboard simultaneously through external USB Hub	
	1.10	<b>Combined Audio-in and Audio-out:</b> 3.5 mm jack (Order: Tip, Ring, Microphone, Ground) for connecting stereo headphones and integrated speaker(s) as well as for external microphone and integrated microphone. Only functional tests shall be carried out.	
		Speaker section capable of generating at least sound of 85 dB +/- 3dB in the frequency range of 20 Hz and 20000 Hz. Microphone section capable of receiving minimum sound of -45 dB +/-4dB in the frequency range of 300 Hz to 3400 Hz	Manufacturer to provide test reports and certificate.
	1.11	<p><b>Display and Resolution:</b> 7" LCD display with at least 800x480 resolutions with 16 bit or higher colour depth.</p> <p><i>LCD brightness should be a minimum of 250 cd/m<sup>2</sup>, and its contrast ratio should be a minimum of 500</i></p>	
	1.12	<b>Input Devices:</b> 7" multi-point projective capacitive touch with a minimum capability of five simultaneous touches	
	1.13	<b>Connectivity and Networking</b>	
		1.13.1	<p><b>WiFi IEEE 802.11 b/g/n</b></p> <ol style="list-style-type: none"> <li>1. Portable Wi-Fi Hotspot functionality</li> </ol>
			<ol style="list-style-type: none"> <li>2. Maximum transmit power &gt;= 15 dBm</li> </ol> <p>Manufacturer to provide test reports and certificate</p>

			3. Minimum receive sensitivity $\leq -83$ dBm	Manufacturer to provide test reports and certificate
			4. Maximum TCP data rate $\geq 25$ Mbps (for both upload and download)	
			5. Performance base line: Sustaining throughput $\geq 1$ Mbps for 2 hours of line of sight distance between Tablet and Access Point being 30 m	
		1.13.2	<b>Bluetooth (Version 2.1 Class 2 or better) IEEE 802.15.1</b>  1. Certification is to be obtained as per Bluetooth SIG 2. All Bluetooth Profiles supported by the Android should be enabled	Manufacturer to provide Bluetooth SIG certificate.
		1.13.3	<b>GSM network data connectivity</b>  1. Through a SIM insertable in to the Tablet 2. 2G GSM, GPRS, EDGE Connectivity 3. Frequency of operation: GSM 900 and GSM 1800 minimum 4. Transmit power exceeding 30dBm 5. Talk time: 5 hours minimum (LCD in standby mode, Audio speaker at a volume of 60dB and WiFi off) 6. Performance baseline: Sustained throughput of more than 40kbps for GPRS download, 10kbps for GPRS upload, 192kbps for EDGE for 2 hours of line of sight distance between Tablet and GSM base station of 1km (max)	Manufacturer to provide certificates for Sl. nos. 4, 5 and 6.
	<b>1.14</b>	<b>Power and Battery</b>		
		1.14.1	1. <b>Battery Capacity:</b> Minimum 3 Hrs for online 720p video playback (LCD with a brightness of 250 cd/m <sup>2</sup> , Audio speaker at a volume of 85 dB, WiFi ON with a receive signal strength between -65 dBm and -70 dBm), Minimum 4 Hrs for offline video playback (LCD with a brightness of 250 cd/m <sup>2</sup> , Audio speaker at a volume of 60 dB, WiFi OFF), Minimum 5 Hrs on web browsing (LCD with a brightness of 250 cd/m <sup>2</sup> , Audio speaker at a volume of 60 dB, WiFi ON with a receive signal strength between -65 dBm and -70 dBm, Cumulative 80MB download through repeated web page load over 5 hrs), 6 Hrs on e-reader (LCD with a brightness of 250 cd/m <sup>2</sup> , Audio speaker at a volume of 60 dB, WiFi OFF)  2. <b>Battery Charging:</b> Should be able to charge from AC from 10% to 80% of battery capacity within 2 hours from external power adapter when the Tablet is switched OFF, support charging from USB port, or from DC power port with receptacle compliant to EIA-J-02 (standardizing on power connector). Two colour LED indication for charging and full charge	Manufacturer to provide safety certificate and test reports on Battery Life, self discharge and protection capability from authorized agency.

			<b>3. Battery Life:</b> <ol style="list-style-type: none"> <li>At 25 degree centigrade, battery should have a life of 600 cycles or 2 years (whichever is earlier) with a minimum left over battery capacity of 50% .</li> <li>Capacity to be <math>\geq 80\%</math> at the end of 300 charge cycles, Capacity to be <math>\geq 50\%</math> at the end of 600 cycles (One cycle consists of standard charging, resting for half an hour, discharging with LCD with a brightness of 250 cd/m<sup>2</sup>, Audio speaker at a volume of 85 dB, WiFi ON with a receive signal strength between -65 dBm and -70 dBm until the Tablet is turned OFF).</li> </ol> <ol style="list-style-type: none"> <li>Self discharge: Battery charge should be <math>\geq 90\%</math> even after 30 days (when the Tablet is turned OFF)</li> <li>Safety: Should comply with IEC 62133 : 2002</li> <li>Short circuit and over charge protection capability.</li> </ol>	
		1.14.2	<b>Battery Charger</b>	
			<ol style="list-style-type: none"> <li>AC input plug: 2-pin Plug (Compliant to Indian Standard)</li> <li>Input voltage range: 100-270V AC</li> <li>AC frequency: 50/60 Hz</li> <li>Cable length: <math>\geq 1</math> m</li> <li>DC output plug: One number compliant to EIA J-02 or Micro USB.</li> <li>Nominal DC output voltage: 5 V</li> <li>Safety and compliance: IS13252, EN 301 489-34</li> </ol>	Manufacturer to provide certificates on safety and compliance.
	1.15	<b>3-Axis Accelerometer</b>		
		1.15.1	Number of axis: 3	
		1.15.2	Orientation change response time for home screen: $\leq 3$ seconds	
		1.15.3	Orientation change response time for browser: $\leq 3$ seconds	
		1.15.4	Range (m/s <sup>2</sup> ) : $\geq 19.6$ (Using Z-device or android sensor tool box application. Equivalent to $\pm 2g$ )	
	1.16	Drivers for Phone Functionality		Manufacturer to provide details
	1.17	Data functionality with optional external dongle for 3G networks		
	1.18	Video/Photo Camera (front facing) with a resolution of 0.3 M Pixel (VGA) or higher		
	1.20	Protective LCD screen guard		
	1.21	Hardware reset (for example through pin-hole, or through long press of power-on key) to reboot the Tablet		
	1.22	Buttons: Power, Volume up and down.		

		1.22.1	Short press of power button for Sleep Mode, long press of power button for shut down options	
		1.22.2	<p>Advanced Android recovery option possible through key combination (Volume up and down for navigation and power button for selection).</p> <ol style="list-style-type: none"> <li>1. Reboot system now.</li> <li>2. Wipe data / Factory reset.</li> <li>3. Apply Android OS update from external SD Card.</li> <li>4. Backup user data.</li> <li>5. Restore user data.</li> </ol>	
<b>2</b>	<b>Software</b>			
	<b><u>Sections 2.1 through 2.6 apply only for Android. Section 2.7 applies only for GNU/Linux.</u></b>			
	2.1	<b>Operating System, System Software.</b>		
		2.1.1	<p>An open source operating system complying with an Open License approved by the Open Source Initiative (OSI)</p> <ol style="list-style-type: none"> <li>1. Default installed OS should be latest Android stable version Android 4.2.1 (Jelly Bean)</li> <li>2. Dual bootable (through external SD Card) GNU/Linux distribution.</li> </ol>	
		2.1.2	Open source generic device drivers (for both in-built hardware including Modules/ICs, touchscreen, and external peripherals mentioned in Sec. 1.7.2) for Android. The device drivers enabled at kernel level.	
		2.1.3	File Manager / File Browser with capabilities to archive and extract files and folders	
		2.1.4	Open GL ES 2.0 Support	
		2.1.5	Maximum cold boot time of 35 seconds	
		2.1.6	Maximum switching time of 5 seconds between the applications Antutu (Version 3.0.3) and Nenamark (Version 2.4).	
		2.1.7	Maximum image (PNG, 720p with 3M minimum file size) rendering time of 2 seconds on clicking the file in the file manager	
		2.1.8	Maximum video (H.264, 720p with 100 M minimum file size) rendering time of 5 seconds on clicking the file in the file manager	
		2.1.9	Android DRM support	Manufacturer to provide certificate

		2.1.10	All 'User's' as well as 'System' applications should have writable permission to an external storage (external SD card)	
	<b>2.2</b>	<b>Document Support</b>		
		2.2.1	Rendering and editing of document formats: DOC, DOCX, PPT, PPTX, XLS, XLSX, ODT, ODP, ODS	
		2.2.2	PDF viewer	
		2.2.3	Text-editor and basic note taking application	
		2.2.4	E-book reader should support formats such as .epub and .pdf	
		2.2.5	Most commonly used Indian Languages/Scripts read/edit capabilities <ul style="list-style-type: none"> <li>1. Read and edit capabilities of Indian Languages Hindi, Kannada, Telugu, Malayalam, Tamil, Marathi, Gujarati, Punjabi, Bengali, Oriya, Bihari, Assamese, Bishnupriya, Manipuri, Urdu, Sanskrit, Devanagari scripts and languages, and new scripts and Indic languages at OS level in the latest OS and right in the rendering engine</li> <li>2. Virtual keyboard (such as MultiLing) should be pre-installed for above languages and scripts at OS level or at Application level</li> <li>3. Should have Unicode support at OS level</li> <li>4. Default language/script should be set to English by Manufacturer. If necessary, user can set to different default language/script from the Settings panel.</li> </ul>	
		2.2.6	20 KB (all text) word document(2007) to be opened in 5 seconds from the file manager	
	<b>2.3</b>	<b>Multimedia and Image Display</b>		
		2.3.1	Image-viewer supporting PNG, JPG, BMP, TIFF and GIF display	
		2.3.2	Media software with the following playing and recording capabilities <ul style="list-style-type: none"> <li>1. Audio Formats: MP3, AAC, WAV</li> <li>2. Video Formats: MPEG-2, MPEG-4, AVI, 3GP</li> <li>3. Should be able to play at-least 720p. Should be able to play at a minimum speed of 30 fps</li> </ul>	
	<b>2.4</b>	<b>Communication and Internet</b>		
		2.4.1	Web-browser (HTML 5(with audio and video tags support), xHTML 5 compliant, JavaScript 1.8 compliant)	
		2.4.2	Audio/Video/Text Chat Conferencing (minimum three way) applications	

		2.4.3	Separate application for online video (capable of playing at least YouTube video)	
		2.4.4	E-mail client with POP, IMAP, SMTP	
		2.4.5	Calendar	
		2.4.6	Default time zone (set to IST) and default language (set to English) pre-configured at the factory	
	2.5	Other utilities		
		2.5.1	Scientific Calculator	
		2.5.2	File compression & decompression utility as part of the file manager and standalone	
		2.5.3	Google Play and accessibility tool (similar to talkback)	
	2.6	Developer Support		Manufacturer to provide self certificate.
		2.6.1	All developer options supported by the Android OS	
		2.6.2	ADB via USB and Wifi to be supported. ADB developer	
		2.6.3	Device drivers for connecting the Tablet to a PC in developer mode (USB debugging) to be provided for the following OS – Windows XP/Vista/7/8	
		2.6.4	Desired applications (including talkback) should be certified with Aakash Market Place and drivers need to be preloaded by the manufacturer. ADB developer option needs to be enabled. Any application that is capable of opening and editing docs (doc, docx, ppt, pptx, xls, xlsx, odt, ods, odp) need to be pre-installed.	
		2.6.5	Factory reset through software settings	
	2.7	Additional OS: [Dual bootable (through external SD Card) GNU/Linux distribution]  <i>The tests for the additional OS may be deferred to the later time upon request from the manufacturers. A conditional certification may be given based on the undertaking from the manufacturer that they would support the additional OS and get that tested by C-DAC prior to the supply of the tablets. In case of the manufacturer's inability to supply the tablets with additional OS on external SD card within stipulated time, the conditional certification will be withdrawn.</i>		Manufacturer to provide bootable SD card with latest Ubuntu
		2.7.1	A stable Linux kernel with all supporting drivers for Tablet hardware (including touchscreen). Vendor to provide the distribution with complete source that works with the Tablet.	
		2.7.2	Kernel should include drivers for generic printers, USB pen drive, USB mouse, USB keyboard, USB hub, USB to serial, USB-CDC network drivers, 3G-Modems, webcams	



		2.7.3	The device drivers need to be enabled at kernel level.	
		2.7.4	A GNU/linux distribution such as Ubuntu 12.04 LTS or Fedora 18 or Debian 7 (Wheezy). Higher versions are also acceptable.	
		2.7.5	Linux distribution should support full hardware acceleration with OpenGL and Direct rendering (DRI2)	
		2.7.6	Battery status indicator with functional sleep mode (power saving mode, screen turns off)	
		2.7.7	Web browser with Java support (through plugin)	
3. Mechanical and Environmental Specification				
	3.1	Weight should be less than 500g		
	3.2	Width, height and thickness should be less than 7.5", 5" and 0.6" respectively.		
	3.3	Ambient operating temperature: 0 to 50 degree Celsius		
	3.4	Storage temperature: -10 to 65 degree Celsius		
	3.5	Operating humidity: 0% to 90% (Non-water vapour condensing). Humidity resistance for 95% humidity exposure for 10 hrs under power off conditions.		
	3.6	Maximum Tablet temperature during non-charging operation should be <= 45 degree Celsius at a room temperature of 25 degree Celsius		
	3.7	LCD touch screen withstanding a pressure of 100 gm/cm <sup>2</sup> over full screen. Finger test of 3.14 cm <sup>2</sup> to be applicable at any point on the screen.		
	3.8	Scratch resistant screen for pencil/pen marks: No scratches for 0.25mm <sup>2</sup> tip (steel material) exerting at 50gm/cm <sup>2</sup> and moving at a speed of 1 m/s		
	3.9	Bending of device: Minimum of 0.25mm/100mm		
	3.10	Impact resistance of 0.5J for casing and 0.22J for display. Corner impact resistance of 1J. Tests shall be carried out using the impact hammer.		
	3.11	The exposure to dust must not allow the dust to enter in sufficient quantity to interfere with the satisfactory operation of the equipment; The testing procedure similar to IP50 may be used.		Manufacturer to provide an undertaking to this effect.
4. Safety and other standards compliance				
	4.1	Material: RoHS, WEEE		Manufacturer to provide certification and test reports
	4.2	Safety: IS 13252		

	4.3	CISPR22/CISPR24	from authorized agency.
	4.4	<p>Environmental &amp; Durability: IS9000 as applicable for equipments and as follows.</p> <p><b>Durability Tests:</b></p> <p>Drop (freefall) Test Height: 1000mm, No. of falls: 8(4 corners + 4 edges) unpacked</p> <p><b>Vibration test:</b></p> <p>Frequency range: 10-55Hz Acceleration: 1g</p> <p>Duration: 45 Min/axis No. of axes: 3, Condition: Unpacked in Power Off mode</p> <p><b>Dry heat test:</b></p> <p>Temperature: 55 deg. Centigrade</p> <p>Duration: 16 hrs. Condition: unpacked in Power Off mode</p> <p><b>Damp heat cyclic test:</b></p> <p>Temperature: 40 deg. Centigrade</p> <p>Relative Humidity: <math>\geq 90\%</math></p> <p>Duration: 48h (2cycles) Condition: unpacked in Power off mode</p> <p><b>Cold Test</b></p> <p>Temperature: <math>-10^{\circ}\text{C}</math> Duration: 2hrs Condition: unpacked in Power off mode</p> <p><b>Burn-in Test</b></p> <p>Temperature 45 deg Centigrade Duration: 48 hrs. Condition: Power on mode with mains connection through battery charger</p> <p>After the exposure to test conditions, the Tablet shall satisfy Visual examinations and functional requirements.</p>	
<b>5.</b>	<b>Maintenance and Serviceability</b>		
	5.1	Build the following as replaceable modules for easy serviceability at qualified service centres: 1. Battery 2. Touch-screen and LCD module 3. Front camera 4. Speaker 5. Motherboard 6. Casing and buttons 7. Charger 8. Casing	Manufacturer to provide BOM and service manual.
	5.2	Should support OTA firmware updates and upgrades through Aakash Market Place	
<b>6,7</b>	<b>Other features and Tablet Package Contents</b>		Manufacturer to

	provide declaration.
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## PROCEDURE FOR SUBMISSION

The manufacturer must submit the duly filled application form for Aakash IV certification with all details and associated documentation.

The Tablet samples must be submitted along with the testing fee of Rs.3.25 lakhs (Demand Draft in favour of C-DAC, payable at Thiruvananthapuram) to **Executive Director, Centre for Development of Advanced Computing, Vellayambalam, Thiruvananthapuram-695033, Kerala.**

The details will be pre-scrutinized by C-DAC and any missing details would be asked for from the manufacturer only once. The testing time will start from the final submission of the Tablets in finished product form along with documents and all other details as envisaged.

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