



**IT CERTIFICATION SERVICES**  
**Iris Authentication Device Specification**

Document : BDCS(A-I)-03-07

Issue : 01 dated. 13.09.2013

Revision 00 dated.

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**Approved by** : \_\_\_\_\_  
Director General,UIDAI

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**Amendment Record**

<b>Amendment No.</b>	<b>Date of Amendment</b>	<b>Nature of Amendment</b>	<b>Page Ref.</b>



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### Iris Authentication Device Specification

#### UIDAI Iris Authentication Device Specification

The iris authentication device specifications are derived primarily from ISO/IEC 19794-6-2011 with tailoring applied for the Indian context (and maintaining consistency with UID enrollment specifications BDCS-03-08).

Device Characteristics	Specification	Reference
<b>Functional</b>		
Spatial Resolution	> 60% @ 2.0 LP/mm <sup>1</sup>	ISO/IEC 19794-6;2011 B.1
Pixel Resolution	> 10 pixels/mm	ISO/IEC 19794-6;2011 B.1
Image Margins	Left & right $\geq 0.6x$ iris radius Top & bottom $\geq 0.2x$ iris radius	ISO/IEC 19794-6;2011 6.1
Imaging Wavelength	700-900 nm	ISO/IEC 19794-6;2011 B.7
Spectral Spread	Power in any 100nm band > 35% of total power	UID specifications BDCS-03-08
Pixel Depth	8 bits/pixel	ISO/IEC 19794-6;2011 B.6
Sensor Signal to Noise Ratio	Noise should not be observable in the captured image	ISO/IEC 19794-6;2011 B:10
Scan Type	Progressive	UID specifications BDCS-03-08
Output Image	At least IMAGE_TYPE_CROPPED_AND_MASKED with JPEG2000 compression.	ISO/IEC 19794-6:2011 Section 6.1,6.4
Contrast	The iris image should have good grey level separation between the iris and sclera and between the iris and pupil and should have sufficient contrast to reveal the iris texture.	ISO/IEC 19794-6;2011 B.4
Optical Distortion	The iris image should not exhibit effects of optical distortion including spherical aberration, chromatic aberration, astigmatism and coma consistent with standard optical design practices	ISO/IEC 19794-6;2011 B.9
Noise	No compression artifacts, particularly blocks, except from a single pass of JPEG2000 compression	UIDAI Iris authentication reports



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Capture Mode	Auto capture with built-in quality check	UID specifications BDCS-03-08
Usability and Ergonomics	Refer to detailed requirements below.	UIDAI Iris authentication reports
Operational Performance	FRR < 1% at FAR of 1 in 100000 with images conforming to Kind7 (Cropped and masked) of size less than 2.5KB (Binary IIR per ISO 19794-6:2011)	Reference – Kind7 iris accuracy report – UIDAI
Capture time	<5 sec*	Refer to Notes section below item f for more details.
Operating temperature	0...50 C (IEC 68-2-2)	
Storage temperature	0...50 C (IEC 68-2-2)	
Dry Heat Test as per 60068-2-2	Temp: 50deg ± 2 C Recovery Period: 1 to 2 Hours	
Damp Heat Cyclic Test (First Cycle) as per 60068-2-30	Temp: 40 C ± 2 C Humidity(RH): 90% ± 2% Duration of Test: 1 cycle of 24Hrs.(12h +12h) Recovery Period: 1 to 2 Hours	
Cold test as per 60068-2-1	Temp: -10 C ± 2 C Duration : 16 Hrs. Recovery Period : 1 to 2 Hrs.	
Damp heat Cyclic Test(Five Cycles) as per 60068-2-30	Temp: 40 C ± 2 C Humidity(RH): 90% ± 2% Duration of test: 5 cycles of 24 Hrs each (12 h + 12h) Recovery Period: 1 to 2 Hours	
Durability Test(IP 54) as per IEC 60529	Dust Test Duration: 8 Hrs. Recovery Period: 1 to 2 Hrs	
	Water Splash test: Test Duration: 10 Minutes Recovery Period: 1 to 2 Hrs.	
Drop test as per 60068-2-31	No. of drops: Six drops (one drop on each face) Height of fall: 1000 mm unpacked condition.	
Vibration Test as per IEC60068 2-6	Frequency: 10...150 Hz, 0.15mm or 2.0g No. of Sweeps: 10 in each axis	



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	Condition: in Packed Condition	
<b>Safety</b>	Exempt Group per IEC 62471:2006-07	
<b>Occupational Health-Safety</b>	RoHS compliant	
<b>Electro-Magnetic compatibility</b>		
ESD Test as per IEC61000-4-2	Type of discharge: contact Type, Test Voltage: Air discharge+8 KV ,contact type+-4Kv	
Radiated Emission	FCC part15B/IEC:CISPR 22 CLASS B standard	
Radiated Immunity	As per IEC/EN 61000-4 3:2006+A2:2010	
<b>Software API</b>	Compliant with UIDAI API specification	Published for POC...Requirement for testing in STQC lab for various tests listed in this document.
<b>Connectivity</b>	USB 2 And / Or USB-IF compliant Exempted for sensors embedded in Form factor designs such as POS terminals, Tablets etc	
<b>Usability and ergonomics</b>	As specified below	
<b>Operating System Support</b>	Minimum support of device drivers for Windows XP onwards/Android / Linux. For purpose of certifications tests, drivers need to be windows XP and above compliant including Software API compliant to UIDAI API specifications as cited above.	

### **Usability and ergonomics**

Device usability and form factor have a significant impact on image quality and matching accuracy. Following Usability requirements shall be adhered:

#### **Ease of Use**

- It is easy and quick to position/align the resident's eye, within the capture volume of the device
- It encourages the resident to sufficiently open their eyes and look (gaze) in a specific direction
- It should quickly and automatically capture the irises
- It gracefully handles effects from the motion of the camera in respect to the eye (linear and angular)

- It should be easy to use by residents with special conditions such as squint eyes, blindness, droopy eyes, lazy eyes and other handicaps

### **Operability**

- Increase device capture volume such as depth of field
- Use physical alignment guide such as visor
- Use visual alignment guide such as view finder, LED and LCD

### **Usability Design**

The features of iris devices required in improving device usability in the Indian context are classified into three categories:

- **Capture aid:** this refers to all the assistance provided to the resident in encouraging correct and quick usage of the device
- **Actionable feedback:** this refers to all the feedback provided to the operator to enable the operator to take a physical or verbal action during the iris capture
- **Informative feedback:** This refers to all the feedback provided to resident about the capture process.

The device design shall incorporate these features.

### **Capture Aid (for resident)**

At least one of the below capture aids to be provided to the resident for ease-of-use:

- **Physical:** Physical aids can be provided to make it intuitive for the resident to align the iris camera to their eye(s). The resident can get tactile feedback and intuitively position the device correctly. The examples are eye cup, eye guard, goggles, etc. The physical structure can assist alignment in z and/or restrict the x and y alignment by utilizing position of the eyes and/or nose
- **Visual:** visual aid can be implemented in a number of ways, for example, by providing a viewfinder for the resident to look through, or look at the reflection of their own eyes in a mirror, or by changing colors of LEDs to convey some predetermined messages such as too far or too close, or a display such as LCD showing the resident and operator what to do for enabling quick capture.
- **Audio:** audio instructions can be provided to the resident by the device or host to aid the alignment and capture. Due to large diversity of languages in India, this is not expected to be very effective, except in case of blind/handicap residents.

### **Actionable Feedback (for operator)**

At least one of the below methods of actionable feedback be provided to the operator for ease-of-use:

- **Visual:** visual feedback may be provided to the operator to take an action to assist the resident in iris capture. A viewfinder can be used by the operator to bring the iris camera to the eye level of the resident, LEDs of predetermined color

and meaning can provide feedback to the operator if the resident is too far or too close to the iris capture device, or a display such as LCD can show in large icons or video. Note that it is better to have this feature on the device itself so that the feedback and the resident are both in the line of sight of the operator and the operator does not have to look at visual feedback that is in a different direction than the resident. If a cell phone or tablet is used as the host device to the iris camera, the host display can be used for showing actionable feedback since the operator can hold the host in the hand and have it in the same line of sight as the resident.

- **Audio:** audio can be used to provide actionable feedback to the operator. The operator then takes a physical action or provides a verbal instruction to the resident.

The actionable feedback to include the following:

- How to correct alignment in x, y, and z
- Open eyes wider (in case of occlusion from eyelids)
- Look straight or look at “object” (in case of incorrect gaze); the object can be reflection of one’s own eye, light source, or some other object
- Hold steady (in case of motion blur)
- Improve focus by moving closer or farther

Informative Feedback (for resident)

- **Visual:** LED/light is on when capturing and turn off when capture is finished; and/or
- **Audio or tactile:** a beep/click and/or vibration of the device can be used to indicate that capture is done.

The following informative feedback to the resident is required:

- Iris capture is in progress
- Capture complete

Actionable feedback streamlines the process, improves speed and avoid confusion.

### Enrollment Cameras

Aadhaar Iris Enrollment cameras which were specified and certified per STQC

specification (refer BDCS-03-08) are considered certified for Aadhaar authentication

purposes using Kind2 images only.

Notes:

1. Per ISO/IEC 19794-6:2011, Annex B.1 measured by MTF using a sine-wave target. In addition, upper limit of 1.05 on MTF is required at all

frequencies to discourage image processing that produces excessive edge sharpening, which can add false details to an image. The output image of sine wave target shall not exhibit any significant amount of aliasing. Aliasing will be investigated by quantitative analysis and from visual observation of the softcopy-displayed image.

2. Per ISO/IEC 19794-6:2011, annex B.6, the image should have a dynamic range spanning 256 grey levels, allocating one byte (8 bits) per intensity value, and providing at least 7 bits of useful intensity information.
3. Operational Performance – Based upon findings during two iris POCs[ refer to reports Iris authentication reports – [Report 1](#) - [Report 2](#)
  - a. Successful Authentication of any one eye at FAR of 1 in 100000 is considered as authenticated.
  - b. 6 allowed authentication attempts for both eyes. All devices vendors are required to follow the sequence of authentication till successful authentication: Left eye-Right eye-Left eye-Right Eye-Left eye-Right eye. Please note that the authentication attempt refers to single eye authentications and not fusion. Authentication packet is expected to carry single iris image
  - c. During certification, only Kind7 (cropped and masked) with sizes less than 2.5KB (Binary IIR per ISO 19794-6:2011) is allowed for authentication.
  - d. Quality of image to be computed within the device without use of any external quality software. No external quality checking software used during the authentication field exercise. Note that device vendor is not expected to use any host (PC) based quality algorithm. All quality checking should be done inside the device or in device driver. There is no requirement to return any quality estimate through the API or logs.
  - e. 1% FRR as measured against population whose iris is already authenticated using an enrollment camera.
  - f. Capture time refers to time gap between starting the capture event from application and capture complete event sent from the camera. UIDAI API and POC application will be used to measure the average capture time. While using single eye camera, capture time refers for single eye capture only and while referring dual eye cameras, capture time refers to time taken to capture both eyes.
  - g. Further details of the operations tests would be extracted from POC9 and POC10 documents.