



# Smart Compliance of Regulations for Registration of Telephone Subscribers

## ABSTRACT

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Customer onboarding process is a very critical step for a Telco as the sensitive services that the customer is subscribing to, could be misused. Hence the identity of the subscriber needs to be established and ensured that the services would never be misused for any other purpose such as frauds, robbery and other thefts including terrorist attacks. Telecom Regulatory authorities such as NCC (Nigerian Communications Commission) and TRAI (Telecom Regulatory Authority of India) on the other hand are imposing very strict regulations for compliance by TSPs (Telecom Service Provider). Any violation would entail huge penalties for the TSPs. Hence there is a need for TSPs to not only comply with these regulations but also onboard the customers faster. But unfortunately, TSPs need to overcome many a challenge to meet these dual objectives. In this white paper, we will delve into the regulations for Onboarding set by NCC and also the TRAI along with the challenges that the TSPs are facing. Finally, a robust solution that addresses the technology, process and people related issues are proposed along with best practices and recommendations.

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# 01

## EXECUTIVE SUMMARY



Telecommunications industry across the world is a highly regulated one due to the nature of the very sensitive services it provides to its subscribers. Regulatory bodies on the other hand have the mandate to ensure personal data security, subscriber identity and verification before allowing any subscriber to avail of the provider's services. These regulations have become more stringent nowadays in the wake of terrorist attacks and other major misuses of these services such as identity thefts, bank frauds etc. Especially, the registration of telephone subscribers has, in the recent past, assumed very high significance and the regulatory bodies such as the NCC (Nigerian Communications Commission, Nigeria) and TRAI (Telecommunications Authority of India, India) have been imposing severe penalties to the tune of even billions of USDs, if the TSPs are found to violate any of their regulations.

In this context, the TSPs are forced to comply very strictly with the regulations of NCC not only to avoid penalties but also to provide better services to their new and existing subscribers. Hence the objectives of TSPs are twofold:

1. To comply very strictly with the relevant regulatory authority, such as NCC
2. To onboard customers faster by getting right first with regulatory requirements, using right technology, right onboarding processes and well-trained people.

They can also leverage on the demographic and subscriber identity data and offer even tailor-made personalized services. This will ensure better quality of service, enhanced customer experience and stickiness that will lead to more cross and upselling of their products and services.

In this white paper we will delve into regulations for registrations of telephone subscribers and the challenges that the TSPs are facing to comply with them, followed by the solutions that they can adopt to streamline their registration processes. A few recommendations and best practices are also suggested as thought leaders and subject matter experts based on the extensive experience of the vendor across the globe from APAC, MEA, EU and Americas. These recommendations are categorized into three broad areas of



***TSPs are incurring huge penalties to the tune of a few millions to billion US dollars due to non-compliance of regulations.***

1. **Product/Technology:** These issues are related to hardware, software and other dependent factors such as connectivity, environment, etc. to capture the subscriber details.

2. **Processes:** The registration process followed to capture the subscriber details, and

3. **People:** The skillset and knowledge required by the POS personnel and the agents involved to capture the subscriber details.

These best practices ensure that the registration process is done correctly and properly the first time and every time, thus ensuring 100% compliance of all regulations and eliminating even the slightest chance of incurring penalties.

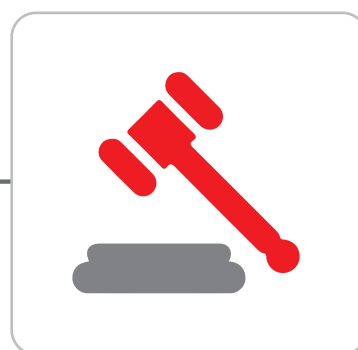


*Objectives of TSPs are twofold –*

*1. Comply with respective regulations strictly, and*

*2. Faster onboarding of customers the first time using right technologies, right onboarding processes and well-trained people.*

## 02 SUMMARY OF NCC REGULATIONS



The following are the broad level registration regulations defined by NCC:

1. Capturing of
  - a. Live facial digital photograph of the subscriber
  - b. 18 different demographic personal information of each subscriber
  - c. A matching fingerprint biometrics of 10 fingers of the subscriber in the specified format by the NCC
  - d. Authentic address of the subscriber
  - e. Primary and secondary contact numbers of the subscriber

2. Uploading of the personal details and the captured biometrics to NCC's Central Database in the specified XML format and timelines
3. Differentiate between Outstation / Foreign National roaming subscribers
4. From the commencement of these Regulations, Licensees, Independent Registration Agents and Subscriber Registration Solution Providers shall in accordance with registration specifications and at no cost to the Commission or the subscriber capture, register and transmit to the Central Database the -
  - a. biometrics and other personal information of subscribers who requests for activation of the licensee's subscription medium ; and
  - b. in the case of a corporate body or other juristic person, the biometrics and other personal information of the authorized representative of the corporate body or other juristic person and the name, address and where applicable, the registration number of the juristic person issued by the Corporate Affairs Commission.
5. A licensee may deactivate and deregister a subscription medium upon a request by a subscriber after verification and confirmation of the subscriber information on the subscription medium.
6. Records on any deactivation or deregistration shall be transmitted to the Central Database by the licensee in accordance with specifications issued by the Commission.
7. There shall be no proxy registration of any subscription medium.

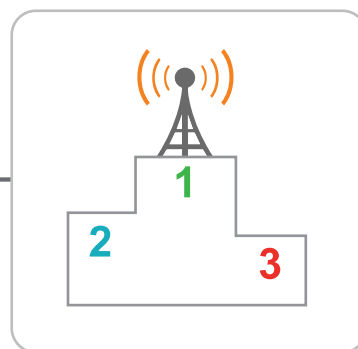
## 03 SUMMARY OF TRAI (TELECOM REGULATORY AUTHORITY OF INDIA) REGULATIONS



All Indian Telecom service providers are mandated to comply with the following regulations as per TRAI mandate.

1. No Pre-Activated SIM Cards should be issued
2. Capture 32(56) mandatory data fields for registration
3. Capture POA (Proof of Address) and POI (Proof of Identification) of the subscriber
4. Subscriber Self-declaration on number of connections
5. Differentiate between Outstation / Foreign National roaming subscribers
6. Maximum bulk mobile connections not to exceed Nine (G9)
7. Online de-duplication (1-many and many to many de-duplication checks) for 9 Connections in all states of India except the following:
  - a. Northeastern states registration for only 6 connections
  - b. Jammu and Kashmir states only 2 connections per subscriber
8. POS (Point of Sale) vendor signature capture on CAF (Customer Application Form)
9. TSP employee signature on the same CAF
10. Tele-verification proof to be captured
11. Subscriber Data entry validation with double data entry
12. Photo cropping with meta data and report generation for Term (monitoring) cell

## 04 PRODUCT / TECHNOLOGY RELATED CHALLENGES



The following are the challenges faced by the TSPs in complying with the above mentioned Regulations:

1. Photo Capture challenges: In most cases unclear and spurious digital photographs are captured due to various reasons such as:

- a. Poor Camera
- b. Poor Light conditions: Many of the PoS personnel are out in the open and it is not technically feasible to capture a clear photo of subscriber in broad daylight due to overexposure despite using a good auto-focus digital camera.
- c. No proper backdrop or background of the subject
- d. Usage of either a spurious or some random photograph. In some cases photos of celebrities and other personalities from magazines and newspapers are used as digital photograph of subscriber by the agents.

2. Biometric Capture challenges:

- a. No way to identify if the thumb, index, middle, ring and little finger is of the right or the left hand. Hence the same random finger can possibly be used often.
- b. The format of the biometric sometimes does not conform to regulatory standards
- c. The captured biometric data is incorrectly serialized in the XML / XSD format as specified by the regulatory authority and is uploaded to the server

3. Connectivity / Power Challenges:

- a. Most PoS agents are often located in remote areas where there is no broadband or connectivity to upload the data to the Regulatory Authority's Centralized server or in some cases the TSP's Data Center. This often leads to customer loss before the registration process and sometimes the captured data of the customer is lost as there is no provision to store the offline data
- b. Power is also a major source of hindrance to capture proper details of the subscriber as the laptops or tablets used for the purpose often run out of charge, thus rendering them useless.



*Technology challenges to comply with regulations include poor photo capture, spurious fingerprints capture, data formatting and uploading to centralized database sometimes with data loss.*

## 05 REGISTRATION PROCESS CHALLENGES



It so turns out that most of the personnel and agents designated to the PoS do not follow a streamlined process of registering subscribers thus leading to many errors and capture of incorrect data or mix-up of data of one subscriber with the other.

## 06 PEOPLE RELATED CHALLENGES



Many of the errors and huge penalties incurred by TSPs in the African region is also due to the poor skillset and knowledge of the personnel and agents involved in the registration process at the PoS. Most of them lack the skills to operate a camera to capture a proper photo, cannot troubleshoot a problem or even lack basic computer operation skills. These people are also not motivated to perform their job properly as they are not incentivized and hence do not show sufficient interest in performing their respective jobs.



## 07 INTENSE RECOMMENDED BEST PRACTICES



As thought leaders, Intense Technologies Limited has extensive experience in the registration of telephone subscribers having implemented the same for many global Telcos for the past 7-8 years across APAC and MEA. Intense has the rare distinction of having 75% market share in the domestic Telecom vertical in India. Currently Intense's tried, tested and trusted product uniserve Onboard is used by major telecom providers in India (Airtel, Idea Cellular etc.) to Onboard 1.3 million customers a day, to comply with the stringent regulations of TRAI (Telecom Regulatory Authority of India) and DoT (Department of Telecommunications).

Basis this vast experience of implementing and streamlining the registration process that comply with the stringent regulations, Intense recommends the following best practices for registration of telecom subscribers as per the respective regional regulations. As mentioned above these recommendations are categorized into three broad areas viz,

1. Technology and product related
2. Telecom subscriber registration process
3. Telecom subscriber agents or people related

### 1.0 Technology and Product Related

Over a long span of 8 years of working closely with the major Telcos in India, Intense has evolved its highly matured and reliable product -- UniServe Onboard. It is easy to use and user friendly interfaces ensure that all the data that is captured is highly accurate with appropriate validations wherever required. In fact, a typical subscriber registration process as per the regulations can be completed accurately in as fast as 80-100 seconds. It is designed and developed to handle many error scenarios with grace and navigates its users to the specific data field error whether it is a photograph, text, date, name etc. It has intelligence built into it to automatically detect a live human face and will NOT accept any other picture as an authentic photograph.

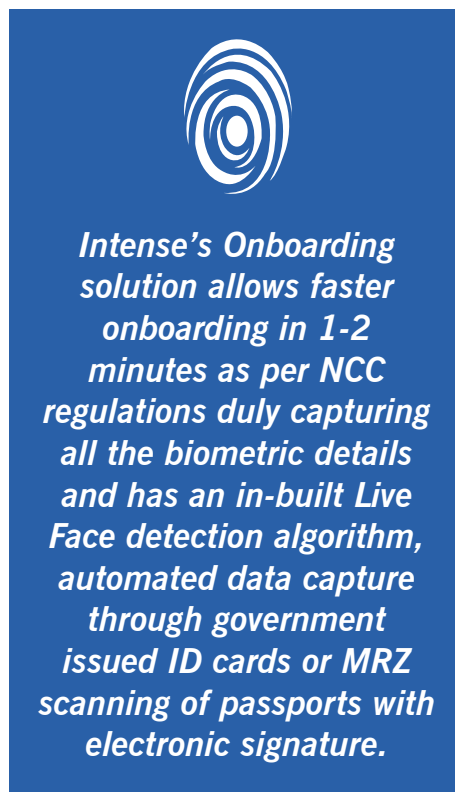


*TSP's customer onboarding agents are ill-trained and ignorant to follow best practices of onboarding telephone subscribers. Thus the processes they follow are very error prone, time consuming and wasted effort.*

Intense's UniServe Onboard is an end-to-end single and comprehensive solution that facilitates:

- Faster onboarding (at customer doorstep or PoS) in about 45-60 seconds – resulting in faster revenue realization
- Reduced cost of onboarding as the process is easy to follow
- Easy regulatory Compliance as per regulations with its Audit and proactive error checking support features.
- Capture of accurate and complete subscriber data as per the regulations
- Increased customer base rapidly
- Export of the captured data in the specified XML / XSD formats as mandated by regulatory authority and uploads the same to their central database.

Subscriber data can also be captured through mobile devices such as Tablets and Smartphones in an automated manner apart from laptops / desktops / notebooks. This data can then be uploaded to a centralized application server and processed for onboarding the customer through an automated case management workflow process system.



### **Salient Regulatory and Business features of Onboard Mobile App:**

- In-built Live face detection algorithm that validates the photograph automatically
- Duplicate Bio-metric finger detection for one or more fingerprint capture. This will eliminate the same finger being used more than once for fingerprint capture.
- Address, First, Last and Middle names field validation with Non-Null data.
- Data capture of personal and other details through scanning of QR codes, passport codes and other valid ID cards obviating the use of keyboard for seamless automatic and accurate data capture into respective fields of the mobile app interface
- Subscribers can directly sign on the touch screen of the device using a finger or a stylus for e-signature capture
- Automated generation of digital CAF complete with photo, signature and overlaying of the captured meta-data in appropriate place holders in the CAF

- POS payment through mobile devices and generation of payment receipt that can be printed on a portable Bluetooth printer
- Easy and dynamic form fields configuration (Addition, Deletion and Modification) on the mobile app screens through server-side application
- Device registration and Mobile app user management through server-side application. This ensures that only authorized users and devices are used to capture data on the field
- GPS tracking of PoS with meta-data mapping. This information is used on the server-side application to map all the consolidated PoS locations on Google map with meta data display on mouse-over of each PoS.

### Salient Non-Functional features of OnBoard Solution:

- Both Online (synchronization of data with the server in real-time, if connectivity is available) and Offline (local storage in case connectivity is not available) data capture support
- Low-bandwidth connectivity support through chunking and caching mechanism, thus maintaining data integrity and preventing data loss.
- Automatic detection of connectivity availability through Wi-Fi, mobile Data, 2G/3G, Data Card etc.
- Self-healing capabilities and Guided log files to arrive at root cause in case of trouble.
- Comprehensive Reports - Operational efficiency, Commission, Productivity reports of POS and Case Management users; Supervisors and other relevant stakeholders help track performance of the users. The solution enhances accountability and enables effective monitoring of the entire process
- Dashboard to monitor performance: Business users can monitor performance on real time basis on their personalized dashboards
- Seamless Integration support with risk rating engine, Service provisioning system, CRM, SMSC, SMTP, Activation System and National ID database. Automatically triggers activation system based on the pre-defined process workflow.



*Intense's Onboarding solution's auditing feature with comprehensive workflow allows for comprehensive checking of the details and ensures zero errors in data capture and upload.*

- Template driven fingerprint data capture. Supports Backup of customer data for disaster recovery, Pending and Rejected lists; Save and Upload; Status of the uploaded information.
- Security is provided at three levels – Application, Users and Data. Uniserve Onboard complies with oWASP security requirements.
- Locally stored documents / data are tamper-proof as all the data is encrypted. The data is decrypted only after it is transferred to the server.

## Salient features of Server–side Case Management App

- Rule and Role based Case Management system for automated routing and processing of CAF (Customer Application Form) for error free checking and verification of address and ID proof documents by CSRs
- Secure and reliable onboarding process that complies with the ever-changing regulatory guidelines
- Easy auditing feature that adheres to the most stringent auditing procedure
- Highly scalable and automated solution that can support onboarding millions of customers through KYC norms
- Integrates with sophisticated de-duplication engine that supports both online and offline matching through prime and set match algorithms to cross-verify and identify the exact customer based on demographics and other parameters
- Easy and faster verification of related documents by CSR through Zone OCR and single-screen view of both data entry fields and the image
- Highly flexible and user friendly workflow designer which can be used to configure any business process with rules and conditional branching at each node in the workflow
- Analytical reports can be generated at any level in the role hierarchy down to the transaction level. These reports can be readily used to monitor and improve process efficiency and increase productivity
- Agent related productivity and commission reports

## 2.0 Recommended Registration Process

Intense recommends the following improvements to the existing registration process:

1. A well-defined SOP (Standard Operating Procedure) needs to be put in place for every agent. This would be very handy for him/her to refer and use as a guide for adopting best practices. The SOP would cover the operations, maintenance and proper upkeep of all hardware, software, devices (Camera, Biometric, Scanner, Network (data card/Wi-Fi/LAN)), troubleshooting etc.

2. Intense recommends validation of fingerprint data not only with the local database at the PoS location but also with the server-side consolidated database through offline comparison.
3. Proof of Address (POA) and Proof of Identity (POI) documents also should be mandated by the registration process for address and person identification. These could be any state issued documents such as a driving license, Income tax account number, or an ID such as employee or student or government issued authorized card wherever available.
4. An electronic Customer Application Form (CAF) with the provided subscriber details along with the captured photo should be generated and signed electronically by the subscriber. This will be a proof of the subscriber registration with the authorized details. A paper print and a payment receipt can also be provided to the registered subscriber.
5. Armed with the state of the art uniserve Onboard application, users such as Agents, CSRs, Auditors, CEOs can easily use their respective user accounts in the application to seamlessly carry out their respective activities. The recommended process flow is as shown in Figure 1.

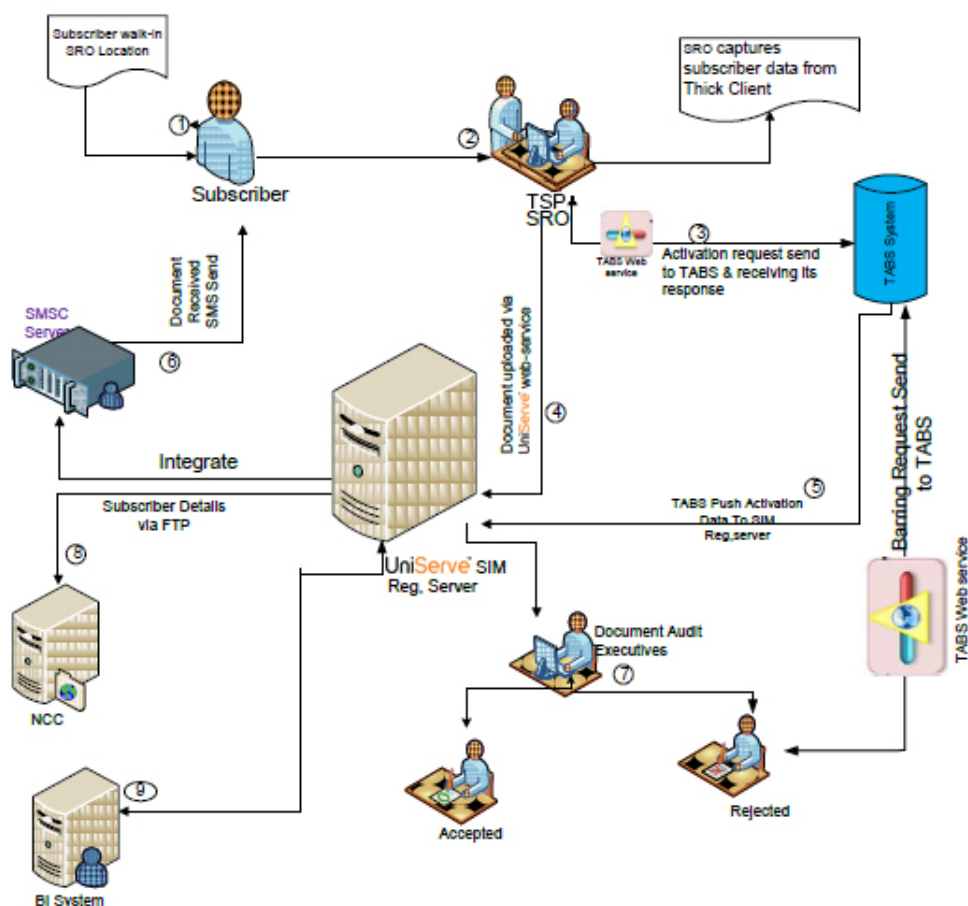


Figure 1. High Level Process Flow of subscriber Registration

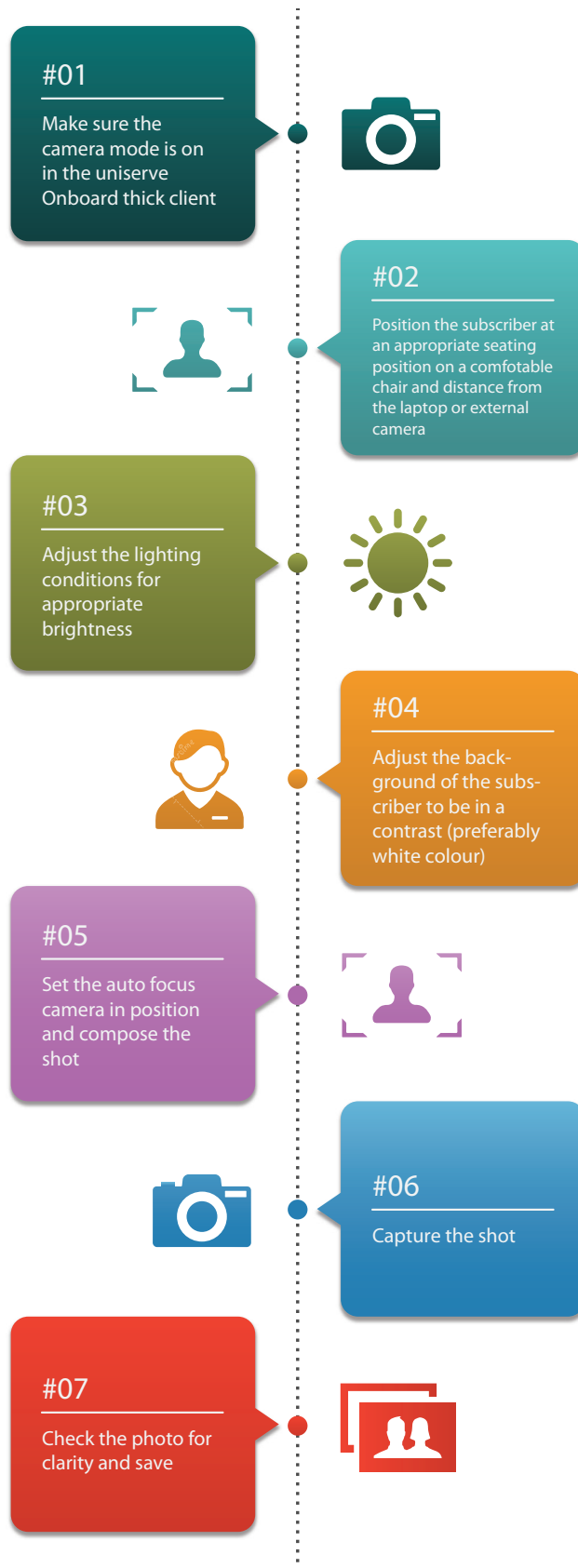


Figure 2. Photo Capture Process

## Facial recognition technology

Like fingerprint biometrics, facial recognition technology is widely used in various systems, including physical access control and computer user accounts security.

Usually these systems extract certain features from face images and then perform face matching using these features. Facial recognition can also be used together with fingerprint recognition or another biometric method for developing more security-critical applications.

The multi-biometric approach is especially important for identification (1-to-many) systems. In general, identification systems are very convenient to use because they do not require any additional security information (smart cards, passwords etc.). However, using 1-to-many matching routines with only one biometric method, can result in a higher false acceptance probability, which may become unacceptable for applications with large databases. Using face identification as an additional biometric method can dramatically decrease this effect. This multi-biometric approach also helps in situations where a certain biometric feature is not optimal for certain groups of users. For example, people who do heavy labor with their hands may have rough fingerprints, which can increase the false rejection rate if fingerprint identification was used alone.

## Basic Recommendations for Facial Recognition

1. Cameras and Images;
2. Lighting;
3. Face Posture;
4. Facial Expression;
5. Live Face Detection;
6. Glasses. Makeup etc..

Face recognition accuracy of Uniserve OnBoard heavily depends on the quality of a face image. Image quality during enrollment is important, as it influences the quality of the face template.

### Cameras and Images

Similar quality cameras are recommended for both enrollment and identification. Using the same camera model is even better.

50 pixels is the recommended minimal distance between eyes for a face on image or video stream to perform face template extraction. 75 pixels or more recommended for better face recognition results. Note that this distance should be native, not achieved by resizing an image.

640 x 480 pixels minimal camera resolution is recommended for face enrollment and recognition.

One has to make sure that native 640 x 480 resolution is provided by a webcam or a smartphone camera, as some of these cameras may have lower resolution that is later scaled up to 640 x 480 without image quality improvement. While it is acceptable for video calls or occasional photos, it will introduce additional distortions and artifacts to the face image.

Lower resolution webcams are not recommended as optical distortions will appear and affect facial template quality because users will have to be too close to the cameras for successful face detection and enrollment.

One also has to check for mirrored face images, as recognition will fail if a face was enrolled from a mirrored image, and later a non-mirrored face image is used for recognition (or vice versa). This happens as some cameras or devices can be configured to produce mirrored images or may even produce them by default, and different cameras or configurations may be used during enrollment and identification. We recommend using face images with uniform orientation – all images within a system should be either native or mirrored, but not mixed between each other.

## Lighting

Controlled lighting conditions are recommended:

Direct frontal or diffused light allows equal lighting distribution on each side of the face and from top to bottom with no significant shadows within the face region.

Avoid glares on face skin or glasses that are produced by some types of illumination.

## Face Posture

The face recognition engine has certain tolerance to face posture:

- head roll (tilt) –  $\pm 180$  degrees (configurable);
- $\pm 15$  degrees default value is the fastest setting which is usually sufficient for most near-frontal face images.
- head pitch (nod) –  $\pm 15$  degrees from frontal position.
- head yaw (bobble) –  $\pm 45$  degrees from frontal position (configurable).
- $\pm 15$  degrees default value is the fastest setting which is usually sufficient for most near-frontal face images.
- 30 degrees difference between a face template in a database and a face image from camera is acceptable for identification.

Several views of the same face can be enrolled to the database to cover the whole  $\pm 45$  degrees yaw range from frontal position.



## Facial Expression

Neutral face expression during enrollment is recommended, as non-neutral face expression may affect the accuracy of recognition. Examples of non-neutral face expressions (they are allowed but not recommended):

- Broad smile (when teeth or the inside of the mouth exposed).
- Raised eyebrows.
- Closed eyes.
- Eyes looking away from the camera.
- Frown.

Slight changes in facial expression are acceptable during identification, as they do not influence the accuracy of face recognition.

## Live Face Detection

A stream of consecutive images (usually a video stream from a camera) is required for face liveness check:

- When the liveness check is enabled, it is performed by the face engine before feature extraction. If the face in the stream fails to qualify as “live”, the features are not extracted.
- Only one face should be visible in these frames.

Users can enable these liveness check modes:

- Active – the engine requests the user to perform certain actions like blinking or moving one’s head.
  - o 5 frames per second or better frame rate required.
  - o This mode can work with both colored and grayscale images.
  - o This mode requires the user to perform all requested actions to pass the liveness check.
- Passive – the engine analyzes certain facial features while the user stays still in front of the camera for a short period of time.
  - o Colored images are required for this mode.
  - o 10 frames per second or better frame rate required.
  - o Better score is achieved when users do not move at all.
- Passive then active – the engine first tries the passive liveness check, and if it fails, tries the active check. This mode requires colored images.

## Glasses, Makeup, Hair, Beard and Moustache

- Several images with different appearance variants are recommended for assuring the quality of recognition in the situations when part of face is covered with glasses or hair:
- Eyeglasses – separate enrollments with and without glasses will assure the best recognition quality for both cases.

### Special recommendations:

- Sunglasses and regular glasses with heavy frames, smile, open-mouth, closed-eyes will decrease recognition quality, as they cover part of face and some facial features become not visible. If possible, they should be avoided during both enrollment and identification.
- Contact lens – the contact lens do not affect the recognition quality. However, persons wearing them sometimes may wear eyeglasses, instead of lens. In this case an additional enrollment with eyeglasses is recommended.
- Heavy makeup is not recommended as it can hide or distort facial features.
- Hair style – some hair styles may cover parts of face, thus hairpins or other means of holding hair off the face are recommended during enrollment.
- Facial hair style changes may require additional enrollments, especially when beard or moustache is grown or shaved off.

### Intense Capabilities:

Intense offers fast, reliable identification with live face detection and the ability of multiple face processing in a single frame and is camera independent, webcam capable, The face recognition algorithm implements advanced face localization, enrollment and matching using robust digital image processing algorithms:

**Simultaneous multiple face processing.** Intense's uniserve can perform fast and accurate detection of multiple faces in live video streams and still images. All faces on the current frame are detected in 0.01 - 0.86 seconds depending on selected values for face roll and yaw tolerances, and face detection accuracy. After detection, a set of features is extracted from each face into a template in 0.6 seconds.

**Gender classification.** Optionally, gender can be determined for each person on the image with predefined degree of accuracy during the template extraction.

### Live face detection

A conventional face identification system can be tricked by placing a photo in front of the camera. Uniserve OnBoard is able to prevent this kind of security breach by determining whether a face in a video stream is "live" or a photograph. The liveness detection can be performed in passive mode, when the engine evaluates certain facial features, and in active mode, when the engine evaluates user's response to perform actions like blinking or head movements.

### 3.0 Recommendations related to People

Intense recommends the following to improve people skills and ensure that the application, software and hardware are appropriately used to capture the subscriber data as per regulations:

1. Photo Capture
  - a. The Operating environment at the PoS should be conducive to capture good authentic photographs with appropriate lighting conditions. Towards this end, Intense recommends using a makeshift closed enclosure tent / Kiosk to control the amount of sunshine and good lighting conditions for photo capture.



**Figure 3. A portable photobooth kiosk.**

- b. Provision for power outlet and battery backup in case of power failure
- c. A comfortable chair should be provided for the subscriber to be in seated position to capture the photo.
- d. The background of the seated position should be made white by hanging a white cloth
- e. The laptop / desktop / notebook / Tablet should be fixed in position to a table such that the distance between it and the subscriber is optimal for capturing

the full face of the subscriber. Optionally, a separate good quality camera with flash option can be fixed to a wall and appropriately positioned to capture the seated subscriber's full frontal face.

## 2. Biometric Capture

- a. The biometric device should be placed comfortably on the table for the subscriber to press the fingers of the relevant hand for data capture.

## 3. Certified Trainings

- a. All agents and personnel need to be well trained and certified in the usage of the software, H/W, troubleshooting, photo capture, Biometric capture, Data entry and any other exception handling situation.

## 4. Incentives

- a. All agents would need to be incentivized to capture all authentic registration information of subscribers as per the regulations and software application process flow. This would go a long way in improving productivity and error-free onboarding of subscribers correctly – the first time and every time.

### About Intense Technologies

Intense Technologies Limited is a global enterprise software products company, headquartered in **India** with a strong and emerging presence in **USA, LATAM, EMEA and APAC**. Our enterprise software products are used globally by Fortune 500s for digitalization of customer experience lifecycle resulting in greater customer centricity and reduced operational expenses.

We have a strong track record of deploying our highly scalable product suite to Banking & Financial services, Insurance, Government, Utilities, Manufacturing and Telecommunication enterprises. We serve customers in **30 countries across 4 continents**, with a 70% market share in Telecom in India

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