Functional Requirements Specification
For
Fair Price Shop Automation
Version 1.3

Document Control Record

Version	Description of Change	Author	Date
1.0	Initial Draft	NIC	5th August 2015
1.1	Updated Sections 3.2.1 ,5.1 to 5.6	NIC	4th September 2015
1.2	Updated Section 1 and 2	NIC	21st September 2015
1.3	Updated Sections 1 to 8	NIC	15th October 2015

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Convention Description

Bold font	Used to provide emphasis for titles, captions and examples
Blue font	Used to represent cross references
Courier new font	Used to represent codes
Green font	Used to represent formulas
Red font	Used to represent notes
Italics	Used to represent important related information

1. Introduction

PDS is an important constituent of the strategy for policy, to ensure availability of food grains to the public at affordable prices, for enhancing the food security for the poor, to aid in poverty eradication and is intended to serve as a safety net for the poor whose number is more than 330 million and are nutritionally at risk. PDS evolved as a major instrument of the Government's economic PDS with a network of over 5 lakhs Fair Price Shops (FPS) and is the largest distribution network of its type in the world. PDS is operated under the joint responsibility of the Central and the State Governments. The Central and State Governments have the responsibility for procurement, storage, transportation and bulk allocation of food grains to their respective Godowns. The responsibility for distributing the same to the consumers through the network of Fair Price Shops (FPSs) rests with the State Governments. The operational responsibilities including allocation within the State, issue of ration cards, supervision and monitoring the functioning of FPSs rest with the State Governments.

Large scale pilferages resulting from diversion and leakages of food grains meant for the poor populace of this country is the bane of the Targeted Public Distribution System. Manual processes related to PDS operations and specifically FPS sale are manual in nature which lead to a lot of diversions as it is not possible to probe whether actual sale happened at FPS or not. The key to make the distribution system uninfected is to ensure the fair Last Mile Delivery of essential commodities.

The solution lies in distributing the essential commodities using biometric authentication of any member of beneficiary in order to restraint the diversion at the FPS level. Fair Price Shops provide the only touch point for the end beneficiary in the total Public Distribution System (PDS). Thus, having transparency in the functioning of FPSs is critical for having greater transparency in the overall PDS value chain.

Therefore, Component –II of the "End-to-End computerization of PDS - (Fair Prices hop Automation)" involves computerization of transactions happening at the FPS level. FPS Automation aims to achieve this computerization by providing a medium to record and transmit the transactions made at the FPS. FPS Automation also intends to authenticate the beneficiary to ensure that the commodity issuance is happening to the intended beneficiary by biometric authentication with UIDAI server.

Broadly, FPS automation with biometric authentication can be achieved in two ways:-

- ***Fully online model*** which requires full time Internet connectivity. The application shall be independent of device, browser and OS. HTML5 and CSS3 are used to implement the same.

- ***Store and forward Model (Deferred Authentication):*** The application shall function in online and offline mode with deferred authentication in case network is not available.

1.1 Purpose of Fair Price Shop Automation

The main purpose is of Fair Price shop Automation is t***o Reduce Leakage and Diversion of commodities.*** The leakages and diversions of PDS commodities can be reduced by ensuring fair last mile delivery of the commodities to the beneficiary.

Decisions and Policies by GoI for implementing FPS Automation Application:

1. ***Inclusion of NFSA:*** As passed by the Parliament, Government has notified the National Food Security Act, 2013 on 10th September, 2013 with the objective to provide for food and nutritional security in human life cycle approach, by ensuring access to adequate quantity of quality food at affordable prices to people to live a life with dignity. For more details, refer http://dfpd.nic.in/nfsa-act.htm

2. ***No denial of Service (DoS):*** The transactions are to be authenticated by beneficiary's biometrics. There shall be no denial of Service of ration to the beneficiary in case authentication is unsuccessful or network is poor. The number of trials shall be configured (3 or 5). Ration will be given, however all the waiver cases and authentication failure cases shall be candidates for audit by State food department.

3. ***UIDAI Authentication:*** The sale of commodities to beneficiary shall be done after biometrics authentication of beneficiary.

1.2 Role of Aadhaar in Public Distribution System

As per the policy, commodities shall be sold to beneficiary after biometrics authentication with Aadhaar Server. Aadhaar Authentication API 1.6 is used for the authentication. For more details refer, https://uidai.gov.in/images/FrontPageUpdates/aadhaar_authentication_api_1_6.pdf

1. ***Aadhaar Seeding:*** The FPS Automation application shall have a provision of Aadhaar seeding. Refer section 6.1 Aadhar Seeding –eKYC for the application model for Aadhaar seeding in Public Distribution System.

2. ***Deferred authentication:*** In case of network un-availability, deferred authentication can be performed. Re-trial for Deferred authentication of fingerprints shall be carried out within next 24 hours as per UIDAI policy. Refer section 6.2 for more details on how deferred authentication shall be achieved.

3. ***IRIS authentication or OTP***: If fingerprints authentication fails, then IRIS authentication will be done. In case of IRIS authentication failure, OTP shall be used. These options will be applicable if the state opts for the same.

1.3 Scope

The key to make the distribution system uninfected is to ensure the Fair Last Mile Delivery of essential commodities.

It is essential to coalesce the transactions at FPS with technology for transparency. If the beneficiary can view the current stock status at FPS and probe into the transactions happening at FPS, the process would be more transparent. This approach will aid by

- Keeping track of FPS transactions
- Shopkeepers cannot fake and deny availability of food grains to beneficiary
- To probe into the pattern of sales at each FPS

1.4 Background

National Informatics Centre (NIC) was established in 1976, and has since emerged as a "prime builder" of e-Governance applications as well as a promoter of digital opportunities for sustainable development. NIC is supporting a majority of the mission mode e-Governance projects, namely National Land Records Modernization Programme (NLRMP), Transport and National Registry, Treasury Computerization, VAT, MG-NREGA, India-Portal, e-Courts, Postal Life Insurance. NIC also lays framework and designs systems for online monitoring of almost all central government schemes like Integrated Watershed Management (IWMP), IAY, SGSY, NSAP, BRGF, Schedule Tribes and other Traditional Forest Dwellers Act.

NIC has carried out pilots for Fair Price Shop Automation with biometric authentication in various districts of Andhra Pradesh, Chandigarh, Chhattisgarh , Haryana, Odisha, Puducherry for Public Distribution system. For more details refer Section 6.3 - FPS Automation in India – (By NIC).

1.5 Constraints

- ***Reflection in PDS cycle of new, modified or deleted Ration Cards:*** The modifications in Ration Card will be reflected in next month allocation and distribution cycle. This is not done in real time to avoid inconsistency at any level of Public Distribution cycle.
- ***Minimum battery for UIDAI authentication:*** Minimum battery requirement for UIDAI authentication is 15-25%.
- ***Closing Balance for an FPS:*** Closing balance can be uploaded only once in a month for a commodity.
- ***Sale Closure:*** After sending the closing balance from FPS device, no sale can be made on same allocation order number.
- ***Allocation Order Generation***: Allocation Order can be only after receipt of closing balance from all the FPS (of the penultimate month).
- ***Network Availability:*** In a store and forward mode, the network is required for receiving Allocation order and beneficiary details, performing deferred authentication, uploading sale transactions and closing balance. Full-time redundant online connectivity is required in fully online mode.

- ***Closing balance and transactions count:*** Even if one transaction is not uploaded by an FPS, closing balance will vary from the actual. Therefore closing balance is calculated from the device with each transaction and stored in encrypted form. When uploaded, transactions and Closing balance are matched at PDS server and reconciled for next month allocation order. Closing balance packet also marks the end of sale from an FPS.
- ***Authentication Device Failure***: Department officials take appropriate decisions and make necessary alternates in case the authentication device fails. The transactions can be recovered from the SIM placed in SAM slot (Mandatory).
- ***Weighing machine***: If not calibrated in regular intervals, weighing machine gives undue advantage to Fair Price Shop owners. Hence binding of weighing machine with handheld device is not advisable.
- ***Signal Boosters:*** Whip Antenna and signal booster might be required to ensure maximum connectivity.

2. Fair Price Shop Automation - Models

2.1 Fully Online FPS Automation Model

Fully Online FPS Automation model refers to fully internet connected model for FPS automation. For biometric authentication of the beneficiary, PoS terminal is connected with central or regional PDS server which is connected to UIDAI server. The sale data is pushed from the FPS to the PDS server and after reconciliation of FPS stock closing balance, next month allocation order details of essential commodities are pushed from PDS server to the FPS terminal. The process flow is as shown in the figure 2.

Basic requirements for this model to function:

- Reliable internet connectivity with sufficient bandwidth.
- Functionality in POS for online finger print authentication with UIDAI Server
- 100% data digitization of RCs with Aadhaar seeding.

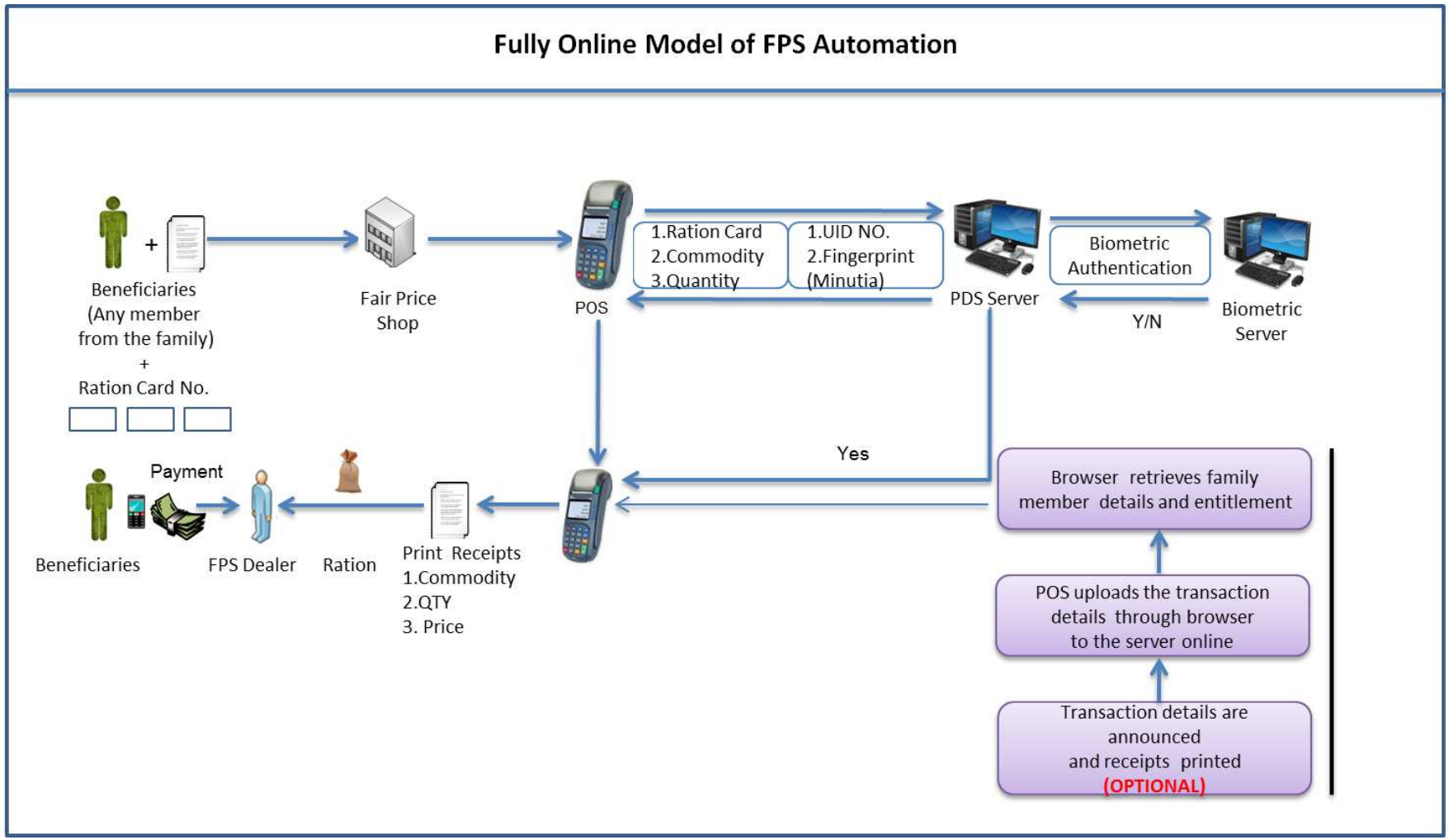

Figure 1: Fully Online FPS Automation

2.1.1 Fully Online FPS Automation Model – Process Workflow

S#	Process flow for Fully Online FPS Automation Model	Detailed Description
1	Allocation Order	Allocation details are made available in POS terminal after allocation order is generated by GOI and is used till its validity.
2	Payment and Stock	FPS dealer makes payment at the depot. Once successful payment is made by the FPS dealer, the FPS is applicable to receive stocks physically (after release order is received). The details of stock with the FPS are updated in PDS server.
3	Commencement of Sale	FPS commences sale of food grains for the month. Distribution of commodities is as per the beneficiary's entitlement fetched from PDS server.
4	Beneficiary Details	When the beneficiary comes to lift the commodity his Ration card number is entered into the system and member and stock details are fetched from the server.
5	Authentication	Beneficiary authentication is done with fingerprint Authentication. If fingerprint authentication fails, IRIS is authenticated and if IRIS does not match OTP is used for authentication.
6	Sale reports and Closing Balance	As the data is transmitted real time, at the end of sale cycle, the total sales made and closing balance are generated automatically and are used to prepare next month's allocation policy.

Table 1: Fully Online FPS Automation

2.1.2 Fully Online FPS Automation Application Functionality

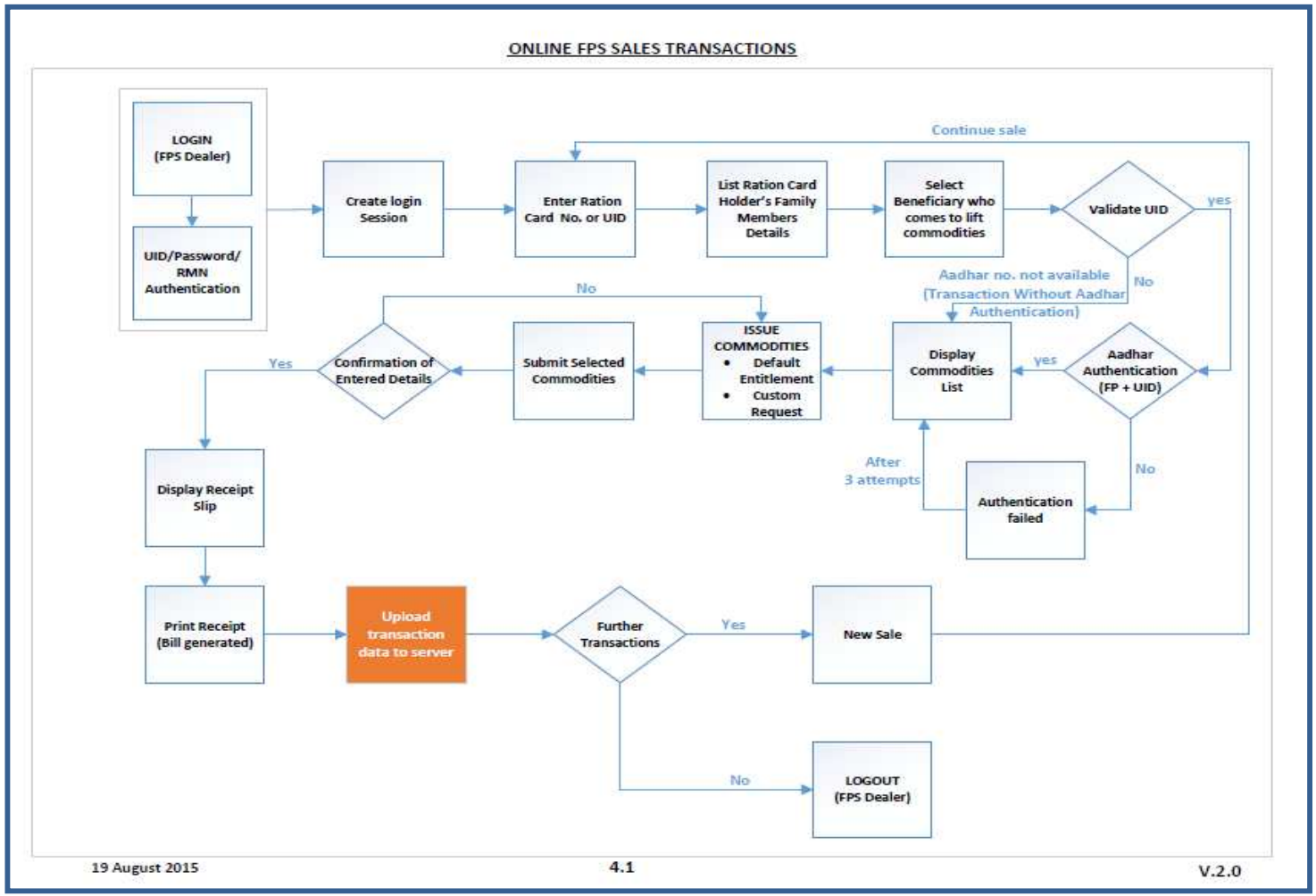

Figure 2: Fully Online FPS Automation Flow Diagram

2.2 Store and forward FPS Automation Model

A large part of our country is still not adequately connected with the internet or with the state network infrastructure. Therefore, it is challenging to implement fully online FPS automation model in those regions where consistent connectivity is not available. To mitigate this challenge, another model for FPS automation has been envisaged where the FPS will not be connected with the backend servers but still be able to conduct transactions using a POS terminal. As and when access to connectivity is obtained, the data is pushed to the PDS servers.

Basic requirements for this model to function:-

- Backend to be fully automated.
- POS with secure application and encrypted local database storage in POS (with appropriate certification from NIC may be installed at each FPS.)
- Transactions shall be stored after encryption.
- Tampering of application or data results in corruption of data and application.
- Internet connectivity is required for deferred authentication and upload of transactions in bulk mode (at nearby location).

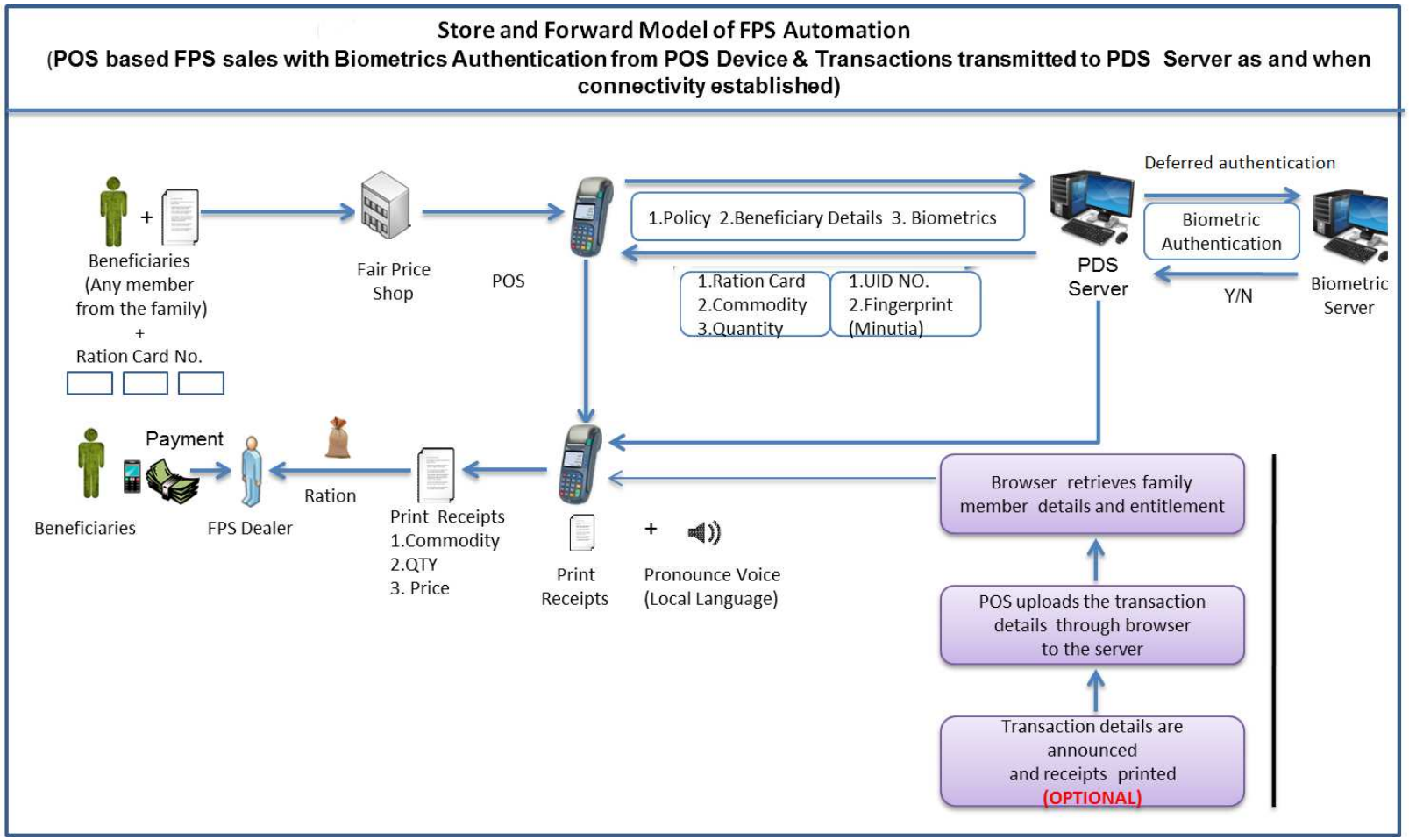

Figure 3: Store and Forward FPS Automation Model

2.2.1 Store and Forward FPS Automation Model – Process Workflow

S#	Process flow for Store and Forward FPS Automation Model	Detailed Description
1	Beneficiary and Entitlement Details	At the start of every month, FPS dealer connects POS device (at the nearest AFSO/FSO/TSO office where connectivity is available) to fetch latest beneficiary and entitlement data.
2	Authentication	In case network is available, Beneficiary's fingerprint authentication is carried out. If network is not available, finger prints are stored in encrypted form and authentication is tried three times within next 24 hours (once network is available or the device is brought to a location where network is available)
4	Payment and Stock	FPS dealer makes payment at the depot. Once successful payment is made by the FPS dealer, the FPS is applicable to receive stocks physically (after release order is received). The details of stock with the FPS are updated in PDS server.
5	Commencement of Sale	FPS commences sale of food grains for the month as per the allocation policy of the month.
6	Sale reports and Closing Balance	The POS terminal is connected to the PDS server or is brought to the nearest AFSO/ DSO/ TSO office for submitting the data to the backend server. The same is alternatively achieved by taking backup of transactions in a pen drive and uploading it through a client machine.

Table 2: Store and Forward FPS Automation

2.2.2 Store and Forward FPS Automation Application Functionality

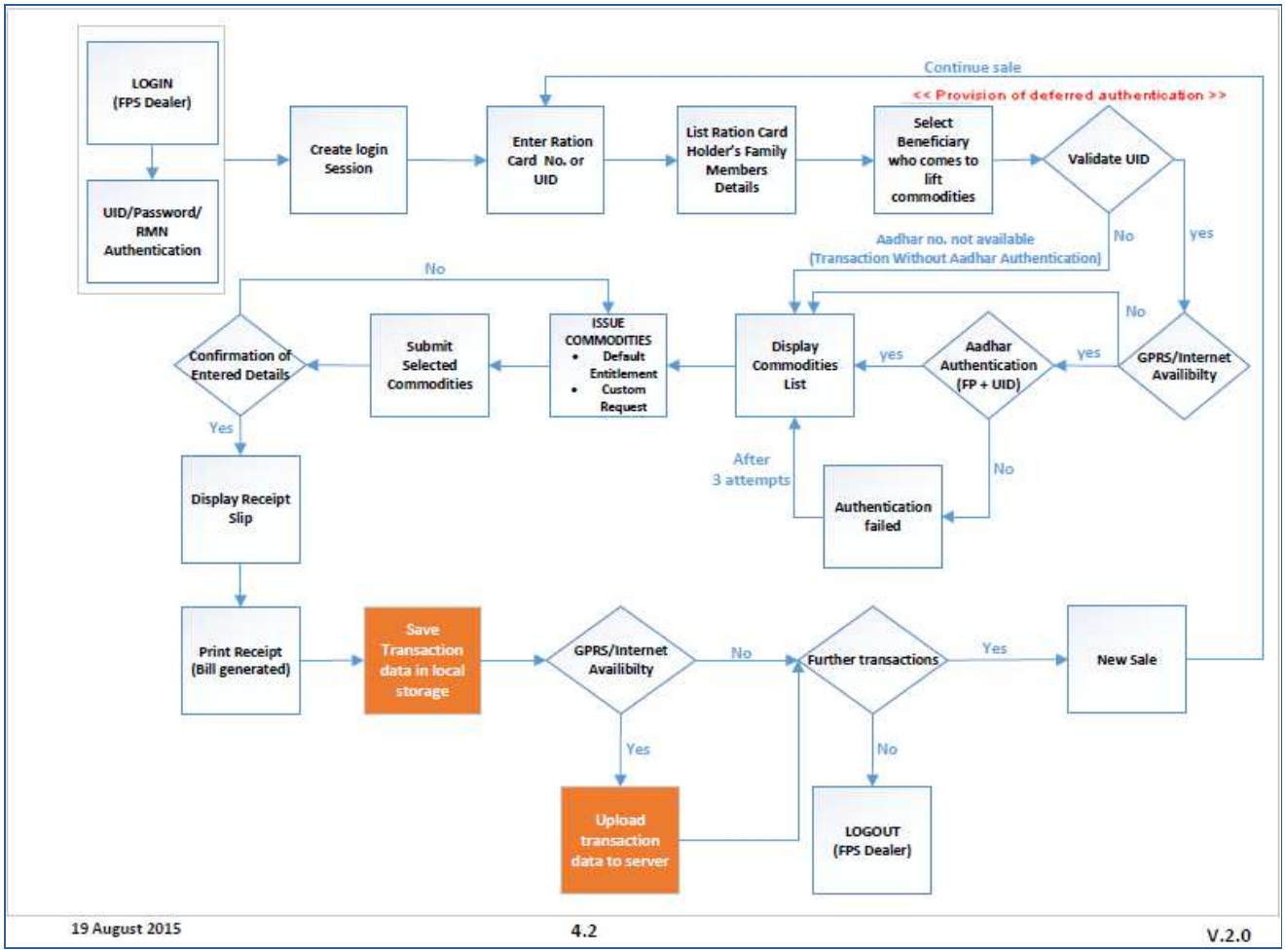

Figure 4 : Store and Forward - Fair price Shop Automation Workflow

3. Allocation Workflow for Fair Price Shop Automation

3.1 Closing Balance Upload

Closing balance means the declaration of leftover stock per commodity for that month to GOI so that the Allocation Order of next month can be generated after re-conciliation of the sale and stocks.

Assuming that the FPS dealer lifts the entire quantity that is entitled to him in Allocation Order, Then Mathematically, Closing balance is the Cumulative Received Quantity minus Sold quantity at the end of sale period (at allocation order validity expiry).

Closing balance = Cumulative Received Quantity – Sold Quantity
Where
Cumulative Received Quantity is the quantity of commodity lifted for a month against an Allocation Order
Sold quantity for a commodity = $\sum_{commodity}$ Transactions quantity against that Allocation Order

Closing balance is calculated from the encrypted transactions only.

Fully Online Mode: In case of fully online model, the uploaded Sales transactions summation is used for calculating closing balance and there is no need to upload closing balance explicitly.

Store and forward: However in store and forward model, there might be a delay in transactions reaching the server. Hence, all the transactions and closing balance need to be uploaded before next month allocation order can be generated. Closing balance upload marks the end of transactions for that month.

Authentication: An FPS sends closing balance after fingerprint authentication. Authentication is mandated to prevent repeated sending of CB by mistake. Therefore, only the authenticated person can send the Closing balance of commodities.

Constraint: Closing balance can be uploaded only once in a month for a commodity.

Sale Closure: Closing balance is calculated once all the transactions are uploaded to the PDS server and sale is frozen for that month. After sending the closing balance from FPS device, no sale can be made on same allocation order number.

Security: In order to ensure that multiple Closing balance are not sent by FPS,

- ***Separate Menu***: Closing balance upload shall be in a separate menu.
- ***Selection of details:*** Provision to upload commodity and month/year shall be given
- ***Popup:*** Popup shall be displayed to ensure that FPS is not doing the same by mistake.
- ***Biometrics Authentication:*** FPS owner shall perform biometric authentication to verify the locking of the closing balance. Authentication makes FPS liable for the sam e.

Logger: PDS Server shall log the date of receiving Closing Balance.

No manual Intervention: Closing balance is calculated from the encrypted transactions only. Closing balance is uploaded from the device using a web service only.

Note: With each transaction, closing balance is calculated and stored in encrypted form in the device. This is because in case closing balance is calculated at the end of sale, some or all of the transactions might already be uploaded to the server.

3.2 Allocation Order Generation

Allocation Order contains allocation policy for a time period (generally for a month) indicating the price and quantity of essential commodities entitled to ration card holders based on their card type.

Pre-requisite: On receipt of closing balance from all the FPS, Allocation Order can be generated by DoFPD.

Fully Online Mode: Card type of a beneficiary indicates his entitlement and price for each commodity. In fully online mode, the calculations of transactions are made at PDS server and POS/tablet device with FPS is used only as a medium of performing authenticated transactions and uploading them back.

Store and forward: The allocation order and policy is received at the device at start of the duration of allocation order. The sale can be carried out till the allocation order is valid and stock is lasting. Delta of Beneficiary details attached to FPS is also sent to the FPS device.

Pr = Price of lifted Quantity = Opted Quantity x Unit price of the commodity against that RC type
TPr = Total Price for a transaction = $\sum_{\text{commodity i=1 to n}}(Pr)_i$
where
Opted quantity < Allocated quantity
Opted quantity < Leftover quantity

Modes of Receipt: Allocation Order can be received through:

- *Allocation Order Unicast on FPS request:* Using PULL AO functionality from FPS device.
- *Periodic AO Poll*: FPS device polls PDS Server for new Allocation Order periodically (every hour)

Payment: FPS goes to depot for payment of the allocated commodities once allocation order is received.

Sale: Sale is stopped in case FPS has no leftover stock else he can commence the sale with the new Allocation order details.

Logger: PDS Server shall log the date of sending the Allocation Order to FPS device.

3.3 Payment and Stock Delivery at FPS doorstep:

Payment : Once the allocation order is generated FPS goes to the depot holder to make payment. The entitlement of FPS is referred from the allocation order of the month.

Stock Delivery : This is the process of physical delivery of essential commodities to the Fair Price Shop owner based on the payment made by him(after release order is generated).

FPS dealer makes payment at the depot. Stock details are entered by Depot holder in PDS application after receiving payment from the FPS owner. On the basis of the payments made by the FPS dealer, the FPS receives stocks both physically and in POS after authentication of route officer.

Pre-requisite: FPS makes payment for being eligible to receive fresh stock of commodities.

Modes of Receipt: Stock can be received through:

- *Periodic Stock Poll*: FPS device polls PDS Server for receiving stock details.
- *Allocation Order Unicast on request:* PULL Stock functionality.

Logger: PDS Server shall log the date of sending the stock details to FPS.

Stock Receipt while delivery at FPS doorstep: Necessary provisions be made for counting on the damage and pilferage while transportation of allocated quantity to FPS. The stock received by FPS might be lesser and hence has to be taken in account before starting the sale. Necessary checks to be ensured for misuse of the feature. Stock receiving shall be done through Route Officer authentication.

3.4 Sale of commodities Beneficiary with UIDAI authentication

Refer Section 2 - Fair Price Shop Automation Models

3.5 Sale transaction upload and Reconciliation

Transactions Upload scenarios

In *Fully Online* and *Store and Forward* modes

- ***Network Availability:*** FPS device sends transactions through web service to PDS Server one by one as and when network is available.
- ***Bulk Transfer:*** In bulk transfer mode, sale transactions are uploaded for an FPS in a single session with PDS server for sales against one allocation order.

In case of *store and forward*

- ***Network Unavailability:*** Encrypted transactions can be copied to USB device and can be sent to server through a utility.
- ***Device Failure:*** SIM placed in SAM slot can be used to upload the encrypted transactions and closing balance to the PDS server

Logger: PDS Server shall log the date of receiving the sale transactions.

4. Functional Requirements

4.1 Data Dictionary for Web Services

Dated	**'01-October-2015**
NOMENCLATURE	
	Header
	Data
	Only in fully online mode
1.1	Data
1.1.1	Subdata within data 1.1
1.1.1.1	Subdata within data 1.1.1
FH	**F**psrequest **H**eader
FD	**F**psrequest **D**ata
PH	**P**ds Server Response **H**eader
PD	**P**ds Server Response **D**ata
[ ]	Specifiy a valid Character set
( )	Specifiy a valid Range

4.1.1 Request Header from FPS Device

4.1.1.1 **FH1 :** Request Header for receiving entitlement and beneficiary details along from PDS Server. The same request Header is used for receiving physical commodity details along from PDS Server. Only the

Packet Header : FH1				**Request Header from FPS for PDSReceiveBeneficiaryAndAllocationRequest , PDSReceivePhysicalStockRequest**				
Node	**Field Id**	**Field Name**	**xml tag name**	**Type**	**Purpose**	**Required**	**Unique**	**Range**
Header	**FH1.1**	fps_id	fps	varchar(12)	Fair Price shop Id : DDDDAAASSSSS	Y		FPS Id is of fixed length and premissible value is numeric [0-9] as per the following pattern DDDDAAASSSSSDDDD - DFSC codeAAA - AFSO codeSSSSS - FPS Shop sequence number covered by AFSOwhereDDDD -First 4 digit makes a DFSO/DFSC/DSO code (First digit is a sequence number within the district , for example , 1 means first dfsc/dfso within the district and Next 3 digits are District code (Reference: 2011 census code for districts)AAA - 3 digits AFSO/ TSO / FSO Code sequence number within the DFSO /DFSC/DSOSSSSS - 5 digits Sequence number within AFSO/TSO/FSO***For testing purpose, the FPS id is SS1111111111 where SS = 2***

								digit state code
	FH1.2	plc_code	plc	varchar(16)	Location code : SSDDDTTTTTVVVVVV	Y		Fixed length PLC Code Permissible value is numeric [0-9] as per the pattern below: SSDDDTTTTTVVVVVV SS - Indian State code 0 to 35 For example: State : Haryana – 06 District : Ambala Code – 070 Tehsil : Barara Code – 00360 Village : Khanpur Code -057521 PLC_CODE Is 06 070 00360 057521 ***(Reference: 2011 RGI census codes)***
	FH1.3	company_code	cc	varchar(2)	Device Company Code	Y		The list shall be released and updated as and when vendor devices are registered. Permissible value is numeric [0-9]

	FH1.4	device_mac_id	mac	varchar(64)	MAC Id of the FPS device.	Y	Y	Shall be either 48 or 64 bits. And has to be registered with Server. Permissible value is numeric [0-9]
	FH1.5	app_version	ver	varchar(5)	Version of Distribution application	Y	Y	xx.yy where xx is major and yy is minor version where x,y E [0-9)
	FH1.6	download date	ddt	date	Date when the request is made	Y		dd/mm/yyyy format

4.1.2 Response Packet Header from FPS Device

4.1.2.1 PD1 PDSReceiveBeneficiaryAndAllocationRequestAck: Response Packet for **sendi**ng entitlement and beneficiary details along from PDS Server.

Packet Data : PD1 PDSReceiveBeneficiaryAndAllocationRequestAck				**Response from PDS Server**				
Node	**Field Id**	**Field Name**	**xml tag name**	**Length**	**Purpose**	**Required**	**Unique**	**Range**
Header	**PD1.1**	fps_id	fps	varchar(12)	Fair Price shop Id : DDDDAAASSSSS	Y		Refer FH1.1
	PD1.2	download date	ddt	date with timestamp	Date when the request is completed	Y		dd/mm/yyyy format

		PD1.3	ration_card_count	rccnt	integer	Count of ration cards attached to an FPS	Y		[0-9].
PD1.4	**Entitlement Policy per card type per commodity**	**PD1.4.1**	allocation_no	ano	varchar	Allocation Number	Y	Y	[0-9]
		PD1.4.2	allocation_type	atype	varchar(1)	Allocation Type	Y		0-Regular 1-Adhoc 2-Additional/Special
		PD1.4.3	card_type	rctype	varchar(2)	Card type indicating Economical status of a family	Y		Card type code for a family indicating economical status
		PD1.4.4	no_of_comm	commcnt	integer	Commodity Count	Y		(0-99). 0 is sent in case allocation order does not exist for that allocation type in that month
	Entitlement per commodity (PD1.4.4 times)	**PD1.4.4.1**	comm_code	commcode	varchar(2)	Commodity Code	Y		premissible value is numeric (0-99) . Refer ePDS Metadata Draft List
		PD1.4.4.2	unit_calculation_flag	unitflag	varchar(1)	Entitlement calculation indicator per commodity per card t ype	Y		u - unit based c - card based m - member based

		PD1.4.4.3	unit price	upice	double	Unit price of that commodity	Y		Up to 2 decimal places
		PD1.4.4.4	measurement_unit	munit	varchar(1)	Measurement Unit	Y		[0-9] . Refer ePDS Metadata Draft List
		PD1.4.4.5	entitled_quantity	eqty	double	Entitled quantity	Y		Up to 2 decimal places
		PD1.4.4.6	lifted_quantity	lqty	double	Lifted quantity . Only in fully online mode.	Y		Up to 2 decimal places
PD1.5	**Refer PD1.4 for 1.4.2 = 1(Adhoc)**								
PD1.6	**Refer PD1.4 for 1.4.2 = 2(Additional)**								
	Ration Card details for (PD1.3) number of cards	**PD1.7**	ration_card_no	rcno	varchar(12)	12 digit unique ration card number as in electronic PDS system	Y	Y	Ration Card number of the beneficiary. It is unique for each beneficiary ithroughout India. ***For testing purpose, the ration card id is SS1111111111 where SS = 2 digit state code***
		PD1.8	ration_card_type	rctype	varchar(2)	Card type indicating Economical status of a family	Y		Card type code for a family indicating economical status. Refer PD1.3

		PD1.9	no_of_members	memcnt	integer	Count of members in ration card.	Y		Valid range of count of members (0-99)
PD1.10	**Allocation details for unit/member based commodities per family**	**PD1.10.1**	allocation_nonrc_based	ano_nr	varchar(99)	Allocation Number	Y	Y	[0-9]. Allocation number for the commodities that are entitled member wise or unit wise not Ration card wise.
		PD1.10.2	comm_code_nonrc_based	commcode_nr	varchar(2)	Commodity Code for unit/member based commodity	Y		Refer PD1.4.4.1 (Commodities that are entitled member wise or unit wise not Ration card wise.)
		PD1.10.3	entitled_qty_nonrc_based	eqty_nr	double	Entitled quantity for unit/member based commodity	Y		Up to 2 decimal places(Entitled quantity for the commodities that are entitled member wise or unit wise not Ration card wise.)
		PD1.10.4	lifted_quantity_nonrc_based	lqty_nr	double	Lifted quantity . Only in fully online mode.	Y		Up to 2 decimal places
PD1.11	**Member Detail repeated (PD1.10) no_of_members times**	**PD1.11.1**	member_id	memid	varchar(14)	Member Id as in elctronic PDS	Y	Y	Member Id is 12 digit Ration Card Id(PD1.7) + 2 digit sequence number of family member id. ***For testing***

									purpose, the ration card id is SS1111111111XX where SS = 2 digit state code and xx = (0-99) is member code
		PD1.11.2	member_name	name	varchar(99)	Name of Member in English	Y		[a-z, A-Z]
		PD1.11.3	relation_with_hof	rel	varchar(2)	Relation of member with Head of Family. SELF means HOF	Y		Relation code
		PD1.11.4	age	age	integer	Member age	Y		(0-120)
		PD1.11.5	member_uid	uid	varchar(12)	UID number of Member	Y	Y	12 digit Aadhaar number seeded and verified.

4.1.2.2 : PD2 PDSReceivePhysicalStockRequestAck: Response Packet for sending stock details along from PDS Server.

Packet Data : PD2 PDSReceivePhysicalStockRequestAck				Response from PDS Server				
Node	**Field Id**	**Field Name**	**xml tag name**	**Length**	**Purpose**	**Required**	**Unique**	**Range**
Header	**PD2.1**	fps_id	fps	varchar(12)	Fair Price shop Id : DDDDAAASSSSS	Y		Refer FH1.1
	PD2.2	allocation_no	orderno	Varchar	Allocation number	Y		Refer PD1.4.1
	PD2.3	allocation_date	odate	Date(dd/mm/yyyy)	Allocation Order date	Y		Refer PD1.4.2
	PD2.4	receipt_date	rdate	date	Physical stock receipt date	Y		dd/mm/yyyy
	PD2.5	commodity_count	commcnt	Integer	Commodity count	Y		[0-9]
FPS Stock Detail	**PD2.6**	commodity_code	commcode	varchar(2)	Commodity Code	Y		Refer PD1.4.4.1
	PD2.7	stock_quantity	sqty	double	Stock quantity	Y		Up to 2 decimal places

4.1.3 Packets from FPS Device

4.1.3.1 PD3 PDSReceiveClosingBalance : Format for sending Closing balance from FPS device to PDS server

Packet Data : PD3 PDSReceiveClosingBalance				Packet from FPS In store and forward model)				
Node	**Field Id**	**Field Name**	**xml tag name**	**Length**	**Purpose**	**Required**	**Unique**	**Range**
Header	**PD3.1**	fps_id	fps	varchar(12)	Fair Price shop Id : DDDDAAASSSSS	Y		Refer FH1.1
	PD3.2	allocation_no	ano	Varchar	Allocation Number	Y		Refer PD1.4.1
	PD3.3	allocation_date	odate	date	Allocation Date	Y		Refer PD1.4.2
	PD3.4	upload_date	udate	date	Closing balance upload date	Y		dd/mm/yyyy

	PD3.5	transactions_count	txncnt	Integer	Number of transactions in sale period to reconcile(Used to cross check closing balance)	Y		[0-9]
Closing Balance Detail	**PD3.6**	commodity_code	commcode	Varchar(2)	Commodity code for which stock is received	Y		Refer PD1.4.4.1
	PD3.7	closing_quantity	cqty	double	Closing/Leftover quanity commodity at the end of sale	Y		Up to 2 decimal places
	PD3.8	measurement_unit	munit	varchar(1)	Measurement Unit	Y		Refer PD1.4.4.4

4.1.3.2 PD4 PDSReceiveTransactions: Format for sending Sale transactions from FPS device to PDS server

Packet Data : PD4 PDSReceiveTransactions				Packet from FPS				
Node	**Field Id**	**Field Name**	**xml tag name**	**Length**	**Purpose**	**Required**	**Unique**	**Range**
Header	**PD3.1**	fps_id	fps	varchar(12)	Fair Price shop Id : DDDDAAASSSSS	Y		Refer FH1.1
	PD3.2	allocation_no	ano	Varchar	Allocation Number	Y		Refer PD1.4.1
	PD3.3	allocation_date	odate	date	Allocation Date	Y		Refer PD1.4.2
	PD3.4	upload_date	udate	date	Transaction upload date	Y		dd/mm/yyyy
	PD3.5	transactions_count	txncnt	Integer	Number of transactions sent for this month in sale period to reconcile(Used to cross check closing balance)	Y		[0-9]

Transactions Detail repeated transactions_count(PD3.5) times	**PD3.6**	transaction_id	txnid	varchar(42)	Sale transaction unique Id	Y	Y	FPS ID(12) + Rc Id(12) + DD+MM+YYYY+hh+mm+ss+.mmm FPS Id - Refer FH1.1 RC Id - Refer PD1.2 DD - Date of Transaction MM - Month of Transaction YYYY - Year of Transaction hh - Hour of Transaction mm - Minutes of Transaction .mmm - DOT delimiter for milliseconds followed by milliseconds
	PD3.7	transaction_date	txndate	Date dd/mm/yyyy	Date of transaction	Y		TRANSACTION DATE without timestamp
	PD3.8	ration_card_no	rcno	Varchar(12)	Ration Card number	Y		Refer PD1.7
	PD3.9	ration_card_type	rctype	varchar	Ration card Type based on economical status of the family	Y		Refer PD1.8
	PD3.10	commodity_code	commcode	Varchar(2)	Commodity code for which stock is received	Y		Refer PD1.4.4.1
	PD3.11	authenticated member_id	memid	varchar(14)	Member who lifted the commodity	Y		Refer PD1.11.1
	PD3.12	authentication status	authstatus	varchar(1)	Success or failure	Y		0 = Not verified 1 = verified

	PD3.13	authentication response code	authcode	varchar(5)	Authentication Response code from UIDAI	Y		Authentication Response code from UIDAI
	PD3.14	quantity_lifted	lqty	varchar(10)	quantity lifted	Y		Up to 2 decimal places
	PD3.15	measurement_unit	munit	Varchar(2)	Sale unit	Y		Refer PD1.4.4.4
	PD3.16	allocation_type	atype	varchar(1)	Type of allocation	Y		Refer PD1.4.2

NOTE	
1	**Lifted quantity per ration card is to be maintained in the device till Closing balance is sent to the PDS server . This is to ensure balance quantity is calculated excatly in case partial transactions are uploaded. (In Deffered authentication mode). However in case of fully online mode lifted quantity will come from PDS server to the device.**

5. FPS Convenience

1. ***One page application:*** The Fair Price Shop automation application shall be as simple as possible. It shall be a one page application if there is no need otherwise.

2. ***No Forced Session Logouts:*** For the FPS convenience, forced session logouts be not there before end of the day (00:00:00 Midnight).

3. ***No intervention from FPS:*** As and when network connectivity is available, the sale transactions shall be uploaded without any need to trigger the sending of the un-sent transactions.

6. Application and Data Security

1. ***Device Binding:*** FPS device numbers are added / deleted from PDS server only. Only registered FPS MAC Ids can function within PDS system.

2. ***Application Encryption:*** The release version of the application shall be encrypted by algorithm and key given by NIC before deployment in the devices. In case the transactional data/application is tried to be tampered, the application shall get corrupt.

3. ***Data Encryption:*** The release version of the application shall be encrypted by algorithm and key given by NIC before deployment in the devices. In case the transactional data/application is tried to be tampered, the application shall get corrupt.

4. ***Audit Trials:*** The result codes of transactions are logged for each FPS, indicating the reason of success or failure. It will also be logged whether the device has a SIM inserted or not along with the timestamp and duration thereof.

5. ***Route Officer Binding:*** Only registered Route officers (or Distribution Officer/Inspector) can deliver commodity to FPS owner within PDS system.

7. Version Management

The vendor FPSA application source code and the application configuration management will be with NIC. The registered version will be able to perform operations with PDS server.

8. Backup and Recovery

1. ***SAM Slot and DR:*** SAM slot shall be used for data recovery and all transactions shall be stored in SIM/DIM/SD card for backup purpose in case the device goes faulty. It is mandatory to have a provision of backup without which application shall not function. Necessary alerts shall be included in the application to ensure the same.

9. Hardware Specifications

9.1 POS Specifications

Sl. No.	Description	Specifications
1	Processor	**Secure Processor** capable of performing at least 10 transactions per minute in laboratory environment (Each Transaction consists of 1. Perform Biometric Authentication of the PDS beneficiary with UIDAI server 2. Generate Encrypted pay load for maximal Sales data. 3. Store Encrypted transaction data in the local storage 4. Transmit the Encrypted transaction sales data to PDS server. 5.Remove the locally stored sales data only after getting acknowledgement from the server)
2	OS	**Secure OS** having an inbuilt web browser supporting HTML5, CSS3, Java Scripts. (Source code of OS shall be CC compliant at least EAL level 2 certified or OS hardened and tested by an independent lab with a declaration of equivalence to CC EAL2)
3	Memory	256MB or Higher RAM and 1GB or higher Flash memory
4	Expansion slot	Micro SD Slot to support SD card with minimum 8 GB high speed SD card
5	Communication	Should support GSM Network with GPRS, Wi-Fi, Ethernet, PSTN
6	Interface	USB 2.0 or higher. The USB port should support device battery charging through any other USB charging source, RS-232 (optional)
7	Display	2.75 inch or higher color TFT Display supporting QVGA (320 x240) or better resolution.
8	Key Pad	Hard (Optional) QWERTY keypad
9	Battery	Swappable &Dry/Rechargeable 2600mAH or higher, Li-ion or Li Polymer battery capable of providing minimum 6 hours of operation while all function of device active.
10	Power Adaptor	Power Adaptor with surge protection and operating range 100 to 240V, 50Hz. AC input.
11	SIM & SAM slot	One or more GSM SIM slot and minimum one SAM slots for software up-gradation in device.
12	Printer	2” or higher Thermal / Non-Thermal Printer
13	Audio (Optional)	Good quality Speaker with 1W or higher output for announcements.

14	Finger Print Scanner	STQC certified Finger Print Module
15	IRIS Scanner (Optional)	STQC certified IRIS scanner Module
16	Smart Card (contact type) (Optional)	1 or 2 Number of Smart Card Reader & Writer (ISO 7816 Complaint)
17	Status Indications	Status indicator provides ease of use, Indicators for connectivity (presence/absence), signal strength, battery status.
18	Other Accessories	Durable Carry Case and user manual etc.
19	SDK	Appropriate SDK need to be provided along with the devices
20	Terminal Management	Device should be remotely manageable in secured mode
21	Environment, Health & Safety Durability, Humidity, EMI/EMC Compliance	Dry heat test- Operating (50 ±2˚C for 2 hrs) Cold test – Operating (0 ±3˚C for 2 hrs) Dry heat test (55 ±2˚C for 2 hrs) Damp heat Cyclic (40˚C for (12+12 hrs)), No. of cycles : 2 Cold Test (-10 ±3˚C for 2 hrs) Drop/Free Fall Test, in unpacked, switched off and normal handling conditions (Height : 100mm, Total

		no. of falls : 2) Vibration Test should be in packed condition, switched off conditions (10-150Hz, 0.15mm/2g, 10 sweep, cycles/axes) Bump test should be in packed condition, switched off condition.(1000Bumps, 40g, in vertical position)
22	Add-On Antenna	May be provisioned for the POS devices which will be used in remote locations and hilly areas for better signal reception and seamless transactions
23	Warranty	Suitable Warranty support

9.2 Mobile Terminal Specification

Sl. No.	Feature	Specifications
1	Display	7” inches or higher scratch resistant multi point capacitive touch screen with minimum WSVGA resolution (1024 X 600)
2	Processor Speed	1 GHz Dual Core or higher ARM /x86 processor or equivalent
3	RAM	1 GB or higher
4	Inbuilt Storage	4 GB or higher flash memory
5	Expansion Slot	At least a micro SD slot supporting up to 32 GB memory card
6	Audio	Good quality Speaker with 1W or higher output for announcements.
7	External Keyboard support (optional)	Device should support keyboard through USB or Bluetooth interface.
8	Connectivity	Device should support both 3G, GPRS and Wi-Fi, should support GPS feature
9	USB ports	At least one free USB port shall be available after setting up the entire solution including peripheral devices
10	Battery	Rechargeable 4000mAH or higher, Li-ion or Li Polymer battery capable of providing minimum 6 hours of operation while all function of device active.
11	Operating System	Operating system should be Linux (Latest Stable Kernel)/Android 4.0 or higher/Windows. Device operating system which supports HTML5 based web browser and CSS 3
12	Certification	RoHS (Restriction of Hazardous substance) CE or UL
13	Camera Barcode Reader	Capable of reading 1D line barcode and QR codes with minimum 5Mp auto-focus camera
14	Indicators	Status indicator provides ease of use, Indicators for connectivity (presence/absence), signal strength, battery status etc.,
15	SAM slot	Device should have at least a SAM slot to support secure loading of signed applications
16	Biometric Sensor	STQC certified Finger Print Module
17	IRIS Scanner (Optional)	STQC certified IRIS scanner Module

18	Smart Card Reader (Optional)	ISO 7816 Compliant
19	Environment & Durability	Dry heat test- Operating (50 ±2˚C for 2 hrs) -Storage-55 ±2˚C for 16hrs.in accordance with IS:9000/part-3/section-5/1977(reaffirmed in 2007). Cold test – Operating (0 ±3˚C for 2 hrs) Storage-minus10degC For 4 hrs. at a temp. of 0 degree C in accordance with IS:9000/part-2/section-4/1977 (reaffirmed in 2007). Damp heat Cyclic --0perating-40˚C,95%RH for (12+12 hrs)), No. of cycles : 2 in accordance with IS:9000/part-5/section-1/1981 (reaffirmed in 2007). During last half an hour of each environmental conditioning as above and after recovery period of two hours the product be checked for 1:1 authentication Drop/Free Fall Test, in unpacked, switched off and normal handling conditions (Height : 100mm, Total no. of falls : 2)

		Vibration Test should be in packed condition, switched off conditions (10-150Hz, 0.15mm/2g, 10 sweep, cycles/axes) Bump test should be in packed condition, switched off condition.(1000Bumps, 40g, in vertical position)
20	Printer	Integrated or external
21	Antenna (mandatory)	Internal
22	Terminal Management	Device should be remotely manageable in secured mode
23	Warranty	Suitable Warranty support

NOTE:

Mobile tablet devices should be preferred devices over POS devices for reasons of its cost, interoperability and easy maintenance. NIC will provide a working application based on Android. Vendor has option to deploy and run NIC application in the device for its complete functionality or Build an application with same functionality exactly similar to NIC application in their device, in such a case the source code, every revised version of the source code and application shall be copyright of NIC.

10. Return Error Codes

Web Services Errors	
Error Code	**Error message**
1000	FPS Id not registered
1001	Invalid PLC code
1002	Invalid company code
1003	Device not registered
1004	Application version mismatch
1005	Date greater than current date
1006	Data type mismatch
1007	Value out of range
1008	Invalid ration card number
1009	Invalid ration card type
1010	Commodity code does not exist
1011	Member id does not exist
1012	Invalid relationship code
1013	Invalid measurement unit code
1014	Timestamp not unique

Device Error codes	
Error Code	**Error message**
2000	SIM card not available
2001	No network in SIM
2002	Invalid SIM card
2003	Printer not connected
2004	Low battery for UIDAI authentication

2005	Mobile data off
2006	Driver not loaded
2007	Paper not avaialable
2008	Device internal problem
2009	Options not supported

Login Errors	
Error Code	**Error message**
3000	Invalid Username or Password.
3001	Account Suspended due to some reason.
3002	Account Deactivated/Expired.

UIDAI Error codes	
Error Code	**Error message**
100	Pi (basic) attributes of demographic data did not match.
200	Pa (address) attributes of demographic data did not match
300	Biometric data did not match
310	Duplicate fingers used 311
312	FMR and FIR cannot be used in same transaction 313 . Number of FMR/FIR should not exceed 10
315	Number of IIR should not exceed 2
500	Invalid encryption of Skey
501	Invalid certificate identifier in ci attribute of Skey
502	Invalid encryption of Pid
503	Invalid encryption of Hmac
504	Session key re-initiation required due texpiry or key out of sync
510	Invalid Auth XML format
511	Invalid PID XML format

520	Invalid device
530	Invalid authenticator code
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540	Invalid Auth XML version 541
542	AUA not authorized for ASA. This error will be returned if AUA and ASA dnot have linking in the portal
543	Sub-AUA not associated with AUA. This error will be returned if Sub-AUA specified in sa attribute is not added as Sub-AUA in portal
550	Invalid Uses element attributes
561	Request expired (Pid->ts value is older than N hours where N is a configured threshold in authentication server)
562	Timestamp value is future time (value specified Pid->ts is ahead of authentication server time beyond acceptable threshold)
563	Duplicate request (this error occurs when exactly same authentication request was re-sent by AUA)
564	HMAC Validation failed
565	AUA license key has expired or is invalid 566
567	Invalid input (this error occurs when some unsupported characters were found in Indian language values, lname or lav)
568	Unsupported Language
569	Digital signature verification failed (means that authentication request XML was modified after it was signed)
570	Invalid key infin digital signature (this means that certificate used for signing the authentication request is not valid
571	PIN Requires reset (this error will be returned if resident is using the default PIN which needs tbe reset before usage)
572	Invalid biometric position (This error is returned if biometric position hint value - posh attribute in Bio element - is not applicable for a given biometric type - type attribute in Bio element.)
573	Pi usage not allowed as per license
574	Pa usage not allowed as per license
575	Pfa usage not allowed as per license
576	FMR usage not allowed as per license 577
577	OTP usage not allowed as per license
581	Fuzzy matching usage not allowed as per license
582	Missing Pi data as specified in Uses
720	Missing Pa data as specified in Uses 721
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730	Missing PIN data as specified in Uses
740	Missing OTP data as specified in Uses 800
810	Missing biometric data as specified in Uses
811	Missing biometric data in CIDR for the given Aadhaar number
812	Resident has not done Best Finger Detection. Application should initiate BFD application thelp resident identify their best fingers. See
Aadhaar Best Finger Detection API specification.	
820	Missing or empty value for bt attribute in Uses element
821	Invalid value in the bt attribute of Uses element
901	Nauthentication data found in the request (this corresponds ta scenariwherein none of the auth data is present)
902	Invalid dob value in the Pi element (this corresponds tascenarios wherein dob attribute is not of the format YYYY or YYYY-MM-DD, or the age of resident is not in valid range)
910	Invalid mv value in the Pi element
911	Invalid mv value in the Pfa element
912	Invalid ms value
913	Both Pa and Pfa are present in the authentication request (Pa and Pfa are mutually exclusive)
930 to 939	Technical error that are internal tauthentication server
940	Unauthorized ASA channel
941	Unspecified ASA channel 980
999	Unknown error
888	XSD Validation Failure
777	CIDR Connectivity Failure
666	XML Parsing error
444	Failure at the ASA Server
333	SignKeyStore File not Found

11. Reference Applications and Tools

11.1 Aadhaar Seeding – eKYC

Aadhaar number is seeded after biometric authentication of the beneficiary with the UID number. In addition the textual and demographic details are also matched with the details from UID server corresponding to the Aadhaar number. Once the demographic and biometric is authenticated, the UID number shall be seeded in PDS Server.

A demo of UID seeded is available at http://164.100.72.83/AadharComparison

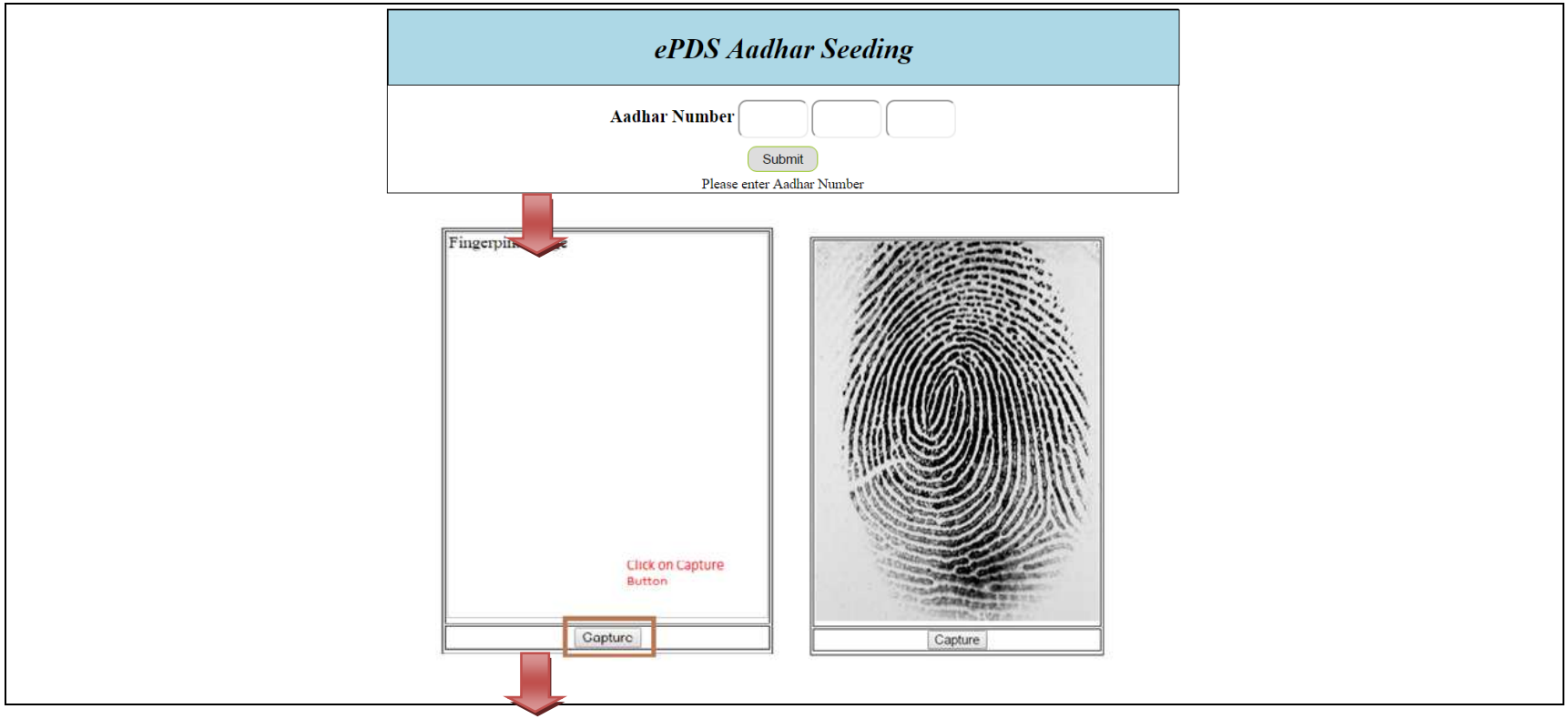

Figure 5: Aadhaar Seeding in PDS - eKYC

11.2 Deferred Authentication

11.3 FPS Automation in India – (By NIC)

State	FPS under coverage	Ration Cards	Beneficiaries	FPS Automation Details
Andhra Pradesh	3847+			Online Aadhaar based authentication with POS device. Coverage of 100 Fair Price shops in East Godavari district and 45 Fair Price shops in Hyderabad district during the year. ePOS (Fair Price Shop automation) integrated with Supply Chain management has been running successfully in AP in 2165 shops of Krishna District since March 2015 and 1682 shops in Kadapa district since Aug 2015.
Chandigarh	60			Pilot implementation has been attempted for Smart Ration Card based delivery for the whole Chandigarh which has 1 District with 27 villages and 60 FPS shops with 1 PRC (State owned godown)
Chhattisgarh	500+			Biometric authentication based Smart Card system is functional. 400 FPSs of Raipur, Durg, Rajnandgaon, Mahasamund, Dhamtari, Jagdalpur cities are now in COREPDS. COREPDS is also operational in 40 FPS of Mahasamund rural area.
Haryana	250			Pilot implementation was done for four blocks of Ambala, Gharaunda, Sonipat, and Sirsa with Smart Ration Card based delivery of essential commodities.
Gujarat	10000+		33,89,286	Food coupons based distribution
Odisha	33	25,000	1,20,000	FPS automation carried out as a part of the strengthening of TPDS through application of biometrics-based technology – a pilot project implemented in Rayagada district, a tribal district with inaccessible remote pockets, hilly-terrain and poor infrastructure. At present under biometric-based system, delivery of commodities in the Fair Price Shop (FPS) is being made through

				both Point of Sale (PoS) devices and Bar-coded card with Token.
Puducherry	392	2,18,956		Smart card based distribution. Number of Regions covered – 2 Pondicherry and Mahe a. Number of FP Shops – 376 - Pondicherry, b. Smart cards available in ePDS – 213545 – Pondicherry 5411 - Mahe c. Transactions updated in server through GPRS – 754058 ; 20246-Mahe d. Max. Transaction for a day – 17/12/2013 – 18,157 transactions e. Max. Number of FP Shops connected - 376 ; Mahe - 16 f. Number of times PDS Policy changed – 4 g. Number of SMS sent - 20300 h. PoS Hardware ID changes - 10 times

Table 3: FPS Automation in States

12. References

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APPENDIX A - GLOSSARY

AO	- Allocation Order
CB	- Closing Balance
DoFPD	- Department of Food and Public Distribution
FPS	- Fair Price Shop
NIC	- National Informatics Centre
PDS	- Public Distribution System
POC	- Proof of Concept
PoS	- Point of Sale
RC	- Ration Card
RMN	- Registered Mobile number
UID	- Unique Identification
UIDAI	- Unique Identification Authority of India