

“FOTP METHOD” A SELF-GENERATED & STRONG SECURED FOTP FOR TRANSACTIONS IN SBI (Can Be Self-Generated in Less Than 2 Seconds of Extra Time)

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ABSTRACT

In this work, a much stronger method of OTP system compared to the existing practiced method in SBI is introduced by developing a new method called by FOTP Method for State Bank of India (SBI). Besides SBI, the method is applicable in any bank in India viz PNB, BOI, UBI, so on.

Keywords: FOTP, Category Code, G12 customer, G234 customer, SIM MSC 2020 : 91G45

1. INTRODUCTION

In this work, the author proposes a new method designated as **FOTP Method** which is a simple but strong Self-generated & Secured Password for SBI transactions. The self generated password is called by **FINAL-OTP (FOTP)** which a customer himself can generate in less than 2 seconds of his own time. For a transaction, FOTP is generated by a very simple activity by the customer. The method proposed will certainly reduce the money scam cases from accounts in banks, happening now-a-days more and more. Although it is applicable to any bank, but for the sake of presentation of the method here, the author refers to SBI with no loss of generality. The FOTP Method is highly secured, much more secured than the existing practices of OTP in SBI, but it does not necessarily mean that it is 101% secured. For a customer, the method works mainly on the basis of the Declaration Form (meant for FOTP Method) submitted by him to SBI and a number of mutually exclusive Categories. The explanation for development of this method can be very easily programmed in the existing relevant “SBI Software” by the SBI IT-staff experts, a simple programming and extension of the existing relevant software. In **FOTP Method**, the abbreviation FOTP stands for the phrase “FINAL OTP”. If any of the existing SBI customers does not want to adopt FOTP Method, he may continue with the existing practiced method of SBI. Several methods are available in the literature viz [1-5], but FOTP is a much advanced method.

The “FOTP Method” can easily protect the bank customers of SBI (or, of any of the existing banks in India) from the stealing cases like the recent stealing cases of Sakshi Gupta case of ICICI Bank, as was reported in newspaper & TV. The recent stealing cases by Sakshi Gupta case of ICICI Bank should not happen in future again. The existing OTP method in SBI is too weak for an all-time successful transactions of any customer of SBI (or any other bank). The proposed FOTP is a highly improved and much more secured OTP for SBI customers (and for customers of any bank).

2. GROUPING OF ALL THE SBI CUSTOMERS

Today almost all educated citizens use two important things : mobile phone and bank facility, be it in SBI or in PNB or in UBI etc or in Gramin Bank.

In this proposal, we divide all the SBI customers in India into the following four groups:-

Group-1: Lower Class / Poor people or simple middle class people

Group-2 : Upper middle class people

Group-3 : Rich people

Group-4 : Very rich people

Our experience (by ways of our friendship with people of all the groups mentioned above) reveals the following two statistics:-

No.1: Most of the Group-1 and even of Group-2 customers have one mobile with one SIM Card, except few cases. Designate these customers by G12 customers.

and

No.2: Most of the Group-2, Group-3 and even of Group-4 customers have one mobile with two SIM Cards (let us name them by the terms SIM-1 & SIM-2) OR have two mobiles with one SIM card for each. Any one SIM card will be SIM-1 and the other SIM card will be SIM-2 as decided by the customer, but once decided it is a fixed decision. Designate these customers by G234 customers.

Note :

(i) We know that OTP sent by SBI is of 6-digit length. However, if SBI issues OTP of higher length in future, then the proposed FOTP Method can be easily updated.

(ii) For the sake of presentation of the proposal here, and with no loss of generality, I have used the bank: SBI (State Bank of India). But the FOTP Method is well applicable in each and every bank in India, like PNB, UBI, BOI,etc including Gramin Bank.

3. DECLARATION BY SBI CUSTOMERS

The FOTP Method is a very simple method. However, the G234 customers of SBI can also avail G12 Method if opted for. There is a special DECLARATION FORM will be available in all branches of SBI. Each and every customer (of G12 or of G234) has to fill up this FORM, and it is one-time declaration.

In the existing practice, as on today, it is experienced by almost all the SBI customers the method: "How to use the online generated OTP for each of the transactions".

3.1 Declaration Form

In **FOTP Method**, every customer C fill-up and submits a Declaration Form (one time submission) to SBI. The proposed format of the Declaration Form is as below (however, to be finalized by SBI experts). It is a one time declaration by the customer for his lifelong facility for FOTP generation to be made before SBI by filling in a Declaration Form.

Once submitted, no changes in future is allowed by the customer, unless there is an unavoidable circumstances stated by the customer and convinced by SBI. The customers are also encouraged not to change Declaration Form for his own security and comfort. The common format of the Declaration Form in SBI for all the customers is as below (this is a proposed format, and needs to be finalized by SBI experts).

DECLARATION FORM
(regarding FOTP generation)

(Customers must read very carefully all the Categories and corresponding Codes before filling in the Declaration Form. A customer should not disclose the data to anybody whatever he enters to fill in this Form. A customer must remember the properties of the category he is opting for and the corresponding Code. He should not forget which SIM card is his SIM-1. This is important)

1. Name (as mentioned in the Accounts) of the first Account holder :
2. Account Numbers on which you want to use FOTP facility :
3. Write the Code of the Category using which you want to generate FOTP ? :
(only one Category you need to mention, not more, from the given list of all categories)
4. Mobile Number (SIM-1) :
5. Another Mobile Number (SIM-2), if you have :
6. Do you want to use both SIM cards to generate FOTP ? : YES / NO
7. Personal pre-Fixed Code of two digits length (open only for the P-Category, not for the other Categories) :
8. Personal pre-Fixed Code of three digits length (open only for the P-Category, not for the other Categories) :

3.2 Important warning to all the customers

- (i) Customers must read very carefully all the Categories and corresponding Codes before filling in the Declaration Form.
- (ii) A customer should not disclose the data to anybody whatever he enters to fill in this Form.
- (iii) A customer must remember the properties of the category he is opting for and the corresponding Code.
- (iv) He should not forget which SIM card is his SIM-1.
- (v) If he uses two SIM Cards SIM-1 and SIM-2, then both the SIM cards must be owned by a single name.
- (vi) Customers are not encouraged to request to SBI for changing the Declaration Form once submitted to SBI. This is for their own security.
- (vii) All the above points are important for every customer who want to avail the FOTP facility from SBI.

4. CONCATENATION OF STRINGS

The notion ‘Concatenation’ of two or more strings is very common in the study of the subject Computer Science in India.

The resultant string in concatenation of two strings (String-1 and String-2) comes always by writing the first string (String-1) on the left and then the second string (String-2) on the right with no gap in between.

Few examples of concatenation of two strings String-1 and String-2 are given below:-

- (i) Concatenation of the two strings 39 and 4183 = 394183
- (ii) Concatenation of the two strings 5142 and 719 = 5142719
- (iii) Concatenation of the two strings 3719 and 0 = 37190
- (iv) Concatenation of the two strings 3 and 8 = 38
- (v) Concatenation of the two strings 0 and 4183 = 04183

In case of 3 strings, the resultant string in concatenation of three strings (String-1, String-2 and String-3) comes always by writing the first string on the left and then the second string at the middle and the third string on the right, with no gap in between.

Few examples of concatenation of three strings String-1, String-2 and String-3 are given below:-

- (i) Concatenation of the three strings 39 and 4183 and 2 = 3941832
- (ii) Concatenation of the three strings 46 and 5142 and 719 = 465142719
- (iii) Concatenation of the two strings 0 and 3719 and 0 = 037190
- (iv) Concatenation of the two strings 3 and 8 and 8 = 388
- (v) Concatenation of the two strings 0 and 4183 and 91 = 0418391

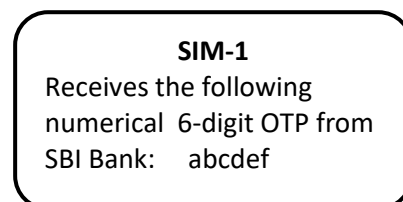
5. CATEGORIES IN THE FOTP METHOD

Let us designate the OTP received by SIM-1 by the term OTP-1, and the OTP received by SIM-2 by the term OTP-2. Therefore, OTP-1 = abcdef and OTP-2 = pqrstu, as shown in the figure below, where a, b, c, are non-negative integer numbers.

For a G12 customer C having one SIM card SIM-1, the customer receives one OTP from SBI to self-generate FOTP. And for a G234 customer C having two SIM cards SIM-1 and SIM-2, the customer receives two OTPs, one in each, to self-generate FOTP. For every transaction, a customer self-generate a FOTP. The SBI Software knows, by the prior declaration of the customer C, which SIM is SIM-1 and which SIM is SIM-2. The following mutually exclusive Categories for FOTP generation will be used in FOTP Method for better and stronger security than the existing amount of security practiced in SBI today. All the Categories are mutually exclusive (non-overlapping) and every Category has a unique Code which is a alphanumerical string of length three (3 characters),

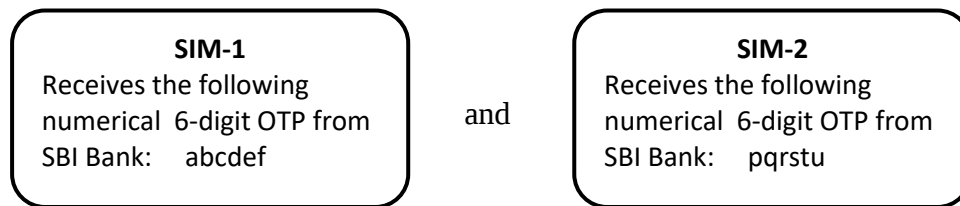
In this method, consider the two SIM cards SIM-1 and SIM-2 of a customer Mr.C (from the G34 customers, say). Both the SIM cards must be owned by a single name. The FOTP generated by C is done by the customer himself by concatenation of strings of characters (integer numbers here).

An OTP received by G12 customers of SBI (having only one SIM Card SIM-1) is as shown in the following figure:-



Now consider the two SIM cards SIM-1 and SIM-2 of a G234 customer C. Both the SIM cards must be owned by a single name. The FOTP generated by C is done by the customer himself by concatenation of strings of characters (integer numbers here). For some Categories, concatenation is to be done by the customer of two strings String-1 and String-2. For other Categories, concatenation is to be done by the customer of three strings String-1, String-2 and String-3.

Two OTPs received by G234 customers of SBI (having two SIM cards: SIM-1 and SIM-2) :-



6. LIST OF VALID CATEGORIES IN SBI

The following Categories are available in SBI for the benefits of the customers to self-generate FOTP. One customer has to choose one and only one Category out of the following listed categories for filling in the Declaration Form for availing the facility of FOTP from SBI. And this Declaration Form remain fixed (permanent) for all the transactions to be done by him with SBI. Because the SBI software will function for this customer accordingly for all of his future transactions. Every Category has a unique Code which is a alphanumerical string of length three (3 characters), as shown below.

Category Code = 015

String-1 will be leftmost 1 digit of OTP-1 and String-2 will be leftmost 5 digits of OTP-2. The FOTP will be self-generated by the customer by doing the concatenation of String-1 and String-2. To self-generate the FOTP, it will not take more than 2 seconds of time of the customer C.

Category Code = 051

String-1 will be leftmost 5 digits of OTP-1 and String-2 will be leftmost 1 digit of OTP-2. The FOTP will be self-generated by the customer by doing the concatenation of String-1 and String-2. To self-generate the FOTP, it will not take more than 2 seconds of time of the customer C.

. Category Code = 024

String-1 will be leftmost 2 digits of OTP-1 and String-2 will be leftmost 4 digits of OTP-2. The FOTP will be self-generated by the customer by doing the concatenation of String-1 and String-2. To self-generate the FOTP, it will not take more than 2 seconds of time of the customer C.

Category Code = 042

String-1 will be leftmost 4 digits of OTP-1 and String-2 will be leftmost 2 digits of OTP-2. The FOTP will be self-generated by the customer by doing the concatenation of String-1 and String-2. To self-generate the FOTP, it will not take more than 2 seconds of time of the customer C.

Category Code = 033

String-1 will be leftmost 3 digits of OTP-1 and String-2 will be leftmost 3 digits of OTP-2. The FOTP will be self-generated by the customer by doing the concatenation of String-1 and String-2. To self-generate the FOTP, it will not take more than 2 seconds of time of the customer C.

Category Code = 015

String-1 will be leftmost 1 digit of OTP-1 and String-2 will be leftmost 5 digits of OTP-2. The FOTP will be self-generated by the customer by doing the concatenation of String-1 and String-2. To self-generate the FOTP, it will not take more than 2 seconds of time of the customer C.

Category Code = 051

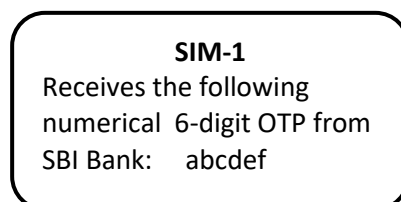
String-1 will be leftmost 5 digits of OTP-1 and String-2 will be leftmost 1 digit of OTP-2. The FOTP will be self-generated by the customer by doing the concatenation of String-1 and String-2. To self-generate the FOTP, it will not take more than 2 seconds of time of the customer C.

6.1 P-Category customers (with pre-fixed personal numerical code of length 2) :-

P-Category is open to the G12 customers and G234 customers both. For both the G12 or G234 customers, every customer will give a prior declaration to SBI about his pre-fixed own choice of fixed two-digit string i.e. about “which will be his fixed String-1”. He has to remember his pre-fixed personal 2-digit code to generate FOTP for every transaction with SBI (like the password of ATM-card every customers has to always remember for every transaction). Let us now present the two groups G12 and G234 separately below :-

(i) for G12 Customers :

For a Single SIM card, where a G12 customer C receives only one OTP from SBI, the following categories of FOTP generation will be good for better security than the existing amount of security.



For every G12 customer C, if he wants to enjoy to belong to the **P-Category customers (with pre-fixed personal numerical code of length 2)**, the following code **P4*** will be the category code.

Category Code = P4*

In this category, the customer C will have a prior declaration to SBI about his pre-fixed own choice of fixed two-digit string String-1. The String-2 will be the leftmost 4 digits of OTP sent by SBI. The FOTP will be self-generated by the customer C by doing the concatenation of String-1 and String-2. To self-generate the FOTP, it will not take more than 2 seconds of time of the customer C.

(ii) for G234 Customers :

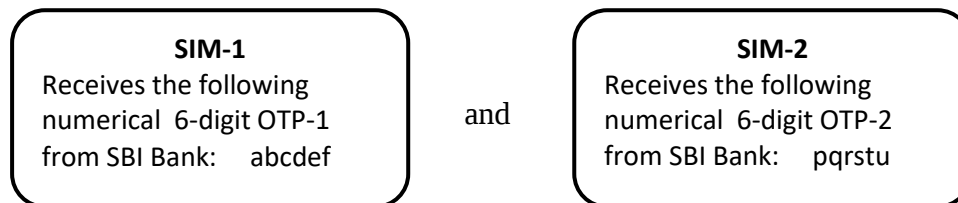
For every G234 customer C, if he wants to enjoy to belong to the **P-Category customers (with pre-fixed personal numerical code of length 3)**, the following two categories are available in FOTP Method for the customer C, out of which the customer C will choose any one.

It may also be mentioned that a G234 customer may opt for any of the categories whatever developed for G12 customers, if he wants. It means that for FOTP generation, he will use

only one of his SIM card according to his declaration in the Declaration Form about “which SIM Card is SIM-1 for him?”.

However, for a G234 customer C interested for stronger security using both the SIM Cards, one of the following three Categories will be his option as the corresponding Code he needs to declare in the Declaration Form. For this G234 customer C, the customer C receives two OTPs in his two SIM cards SIM-1 and SIM-2 respectively.

Two OTPs OTP-1 and OTP-2 will be received by G234 customers C of SBI (who is having two SIM cards: SIM-1 and SIM-2) as shown in the figure below :-



The following three categories are available for G234 Customers for opting any one :-

Category Code = P13

String-1 is the pre-fixed personal 2-digit code, String-2 will be the leftmost 1 digit of OTP-1 and String-3 will be leftmost 3 digits of OTP-2 sent by SBI. The FOTP will be self-generated by the customer C by doing the concatenation of the three strings String-1, String-2 and String-3. To self-generate the FOTP, it will not take more than 2 seconds of time of the customer C.

Category Code = P31

String-1 is the pre-fixed personal 2-digit code, String-2 will be the leftmost 3 digits of OTP-1 and String-3 will be leftmost 1 digit of OTP-2 sent by SBI. The FOTP will be self-generated by the customer C by doing the concatenation of the three strings String-1, String-2 and String-3. To self-generate the FOTP, it will not take more than 2 seconds of time of the customer C.

Category Code = P22

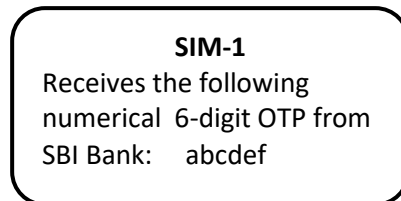
String-1 is the pre-fixed personal 2-digit code, String-2 will be the leftmost 2 digits of OTP-1 and String-3 will also be leftmost 2 digits of OTP-2 sent by SBI. The FOTP will be self-generated by the customer C by doing the concatenation of the three strings String-1, String-2 and String-3. To self-generate the FOTP, it will not take more than 2 seconds of time of the customer C.

6.2 P-Category customers (with pre-fixed personal numerical code of length 3) :-

This type of P-Category also is open to the G12 customers and G234 customers both. For both the G12 or G234 customers, every customer will give a prior declaration to SBI about his pre-fixed own choice of fixed two-digit string which will be String-1. He has to always remember this pre-fixed personal 3-digit code to generate FOTP for every transaction with SBI (like the password of ATM-card every customers has to remember). Let us now present the two groups G12 and G234 separately below :-

(i) for G12 Customers :

For a G12 customer C the following code will be the category code. For a Single SIM card, where a G12 customer C receives only one OTP from SBI, the following categories of FOTP generation will be good for better security than the existing amount of security.



Category Code = P3*

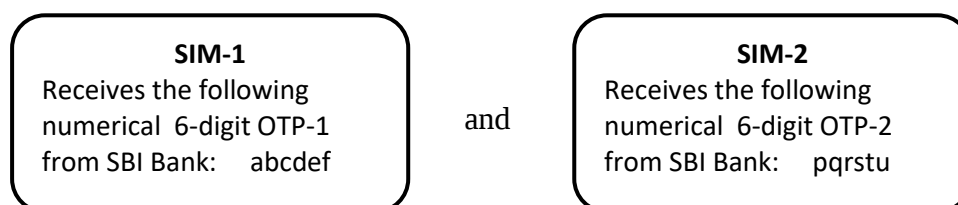
String-1 is the pre-fixed personal 3-digit code. In this category, the customer C will have a prior declaration to SBI about his pre-fixed own choice of fixed three-digit string String-1. String-2 will be the leftmost 3 digits of OTP sent by SBI. The FOTP will be self-generated by the customer by doing the concatenation of String-1 and String-2. To self-generate the FOTP, it will not take more than 2 seconds of time of the customer C.

. (ii) for G234 Customers :

It may be mentioned that a G234 customer may opt for any of the categories whatever developed for G12 customers, if he wants. It means that for FOTP generation, he will use only one of his SIM card according to his declaration about “which SIM Card is SIM-1 for him?”.

However, for a G234 customer C interested for stronger security using both the SIM Cards, one of the following three codes will be his option of the customer as his category code to be declared in the Declaration Form. For this G234 customer C, the customer receives two OTPs in his two SIM cards SIM-1 and SIM-2 respectively.

Two OTPs OTP-1 and OTP-2 will be received by G234 customers C of SBI (who is having two SIM cards: SIM-1 and SIM-2) as shown in the figure below :-



The following two categories are for G234 Customers :-

Category Code = P12

String-1 is the pre-fixed personal 3-digit code, String-2 will be the leftmost 1 digit of OTP-1 and String-3 will be leftmost 2 digits of OTP-2 sent by SBI. The FOTP will be self-generated by the customer C by doing the concatenation of the three strings String-1, String-2 and String-3. To self-generate the FOTP, it will not take more than 2 seconds of time of the customer C.

Category Code = P21

String-1 is the pre-fixed personal 2-digit code, String-2 will be the leftmost 2 digits of OTP-1 and String-3 will be leftmost 1 digit of OTP-2 sent by SBI. The FOTP will be self-generated by the customer C by doing the concatenation of the three strings String-1, String-2 and

String-3. To self-generate the FOTP, it will not take more than 2 seconds of time of the customer C.

7. How a ‘transaction-process’ of a customer C will be executed in SBI ?

- (i) For a transaction, SBI sends OTP-1 to the customer C of G12 group. For G234 customers, SBI sends OTP-1 and OTP-2 both. SBI sends OTP-1 to SIM-1 and OTP-2 to SIM-2 (according to information available in the Declaration Form)..
- (ii) SBI Software immediately itself computes the FOTP which is expected to come from this customer C (in accordance with the Code entered by the customer C in the Declaration Form). But SBI will not disclose its self-computed FOTP to the customer C, during or after the transaction.
- (iii) The customer C self-generates his FOTP for this transaction, and sends it to SBI (at the appropriate place mentioned by SBI for the customer C.
- (iv) SBI-Software now will match its own computed FOTP with the FOTP /sent by the customer C. This matching process executed by the SBI Software may lead to either “Yes, matched” or to “No, not matched”
- (v) If the SBI Software finds the two FOTP matching each other, SBI does the rest job for successful completion of the transaction for the customer C. Otherwise, SBI says that: “Your FOTP is not correct”.

8. IMPLEMENTATION OF FOTP METHOD IN SBI SOFTWARE

Although the theory part of FOTP Method looks slightly lengthy, but its software implementation in the existing SBI Software will be very easy. Declaration Form and Codes as well as properties of all the Categories are of “IF-THEN-ELSE” type. SBI has a strong IT team, and an excellent software catering to the comfort of its large number of customers.

9. CONCLUSION

In this work, a much stronger method of OTP system compared to the existing practiced method in SBI (in particular for YONO SBI Net Banking System) is introduced by developing a new method called by **FOTP Method** for SBI. The method proposed will certainly reduce the present frequent events of money scam cases from accounts in banks, happening now-a-days more and more. FOTP is self-generated by each customer corresponding to each and every transaction. For every transaction, there is one FOTP to be self-generated by the concerned customer. FOTP is generated by concatenation of multiple strings. FOTP is of dynamic type by virtue of its construction by the customer. To generate a FOTP, a customer will take a maximum 2 seconds of time. A customers should not forget the Code of his category, which he entered into the Declaration Form he submitted to SBI. SBI has a powerful IT team of its own, and hence the software implementation of the FOTP Method will be a nice and interesting easy job for them.

If any of the existing SBI customers does not like to adopt FOTP Method although it is for more security, he may continue with the existing practiced method of SBI. In FOTP Method, if any of the G234 customers of SBI does not like to use his two SIM Cards for self-generating FOTP, he may opt for any of the Category meant for G12 customers. Huge flexibilities are available in the proposed FOTP Method.

The FOTP Method of SBI is much superior method compared to the “Physical Security Device” feature used in HSBC bank for transaction. Besides that, now-a-days mobile (mobiles) is carried by almost all adult citizens of India at their locations, but carrying a

Physical Security Device all time is just an additional burden. The FOTP method is applicable to any of the banks in India, but SBI being the largest bank may adopt the method first to observe its merits.

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