RJIL/TRAI/2018-19/132
04th May 2018

To,
Sh. Syed Tausif Abbas
Advisor (NSL-II),
Telecom Regulatory Authority of India,
Mahanagar Doorsanchar Bhawan,
Jawahar Lal Nehru Marg, New Delhi 110002

Subject: Comments on Consultation Paper on 'Review of Mobile Number Portability (MNP) process' dated 06.04.2018.

Dear Sir,

Please find enclosed herewith comments of Reliance Jio Infocomm Ltd. on the consultation paper on 'Review of Mobile Number Portability (MNP) process' dated 06.04.2018, for your kind consideration.

Thanking You,
For **Reliance Jio Infocomm Limited,**

Kapoor Singh Guliani
Authorised Signatory

RELIANCE JIO INFOCOMM LIMITED

Enclosure: As above.

RELIANCE JIO INFOCOMM LTD'S COMMENTS ON TRAI'S CONSULTATION PAPER ON "REVIEW OF MOBILE NUMBER PORTABILITY (MNP) PROCESS" (Consultation Paper Dated 6th April, 2018)

General Comments:

1. At the outset, we thank the Authority for issuing this consultation paper to review and revise the Mobile Number Portability (MNP) process. The technological developments, the changes in the sector and the general dissatisfaction of the consumers with long drawn MNP process implied that a comprehensive review was required.

2. While the Authority has been carrying out minor adjustments to the MNP Process to accommodate operational issues in the past, it is high time to implement the instant MNP, which is a legitimate consumer expectation. The subscriber opting to port out for reasons like QoS, billing disputes, better tariffs, better network etc. was being unnecessarily forced to live with the current service provider for at least 7 more days despite having exercised the right to move away. This led to many practical difficulties for the subscribers, the worst case being the subscriber living without any service for 7 days, causing irreparable losses.

3. RJIL has been urging the Authority to shorten the porting process for the above reason and in order to tackle the menace of segmented offers. The Donor Operators (DO) have been exploiting the prevailing prolonged porting period to indulge in furtive practice of one-to-one discount and offers, in violation of TRAI's reporting requirements and various other related regulations and directions.

4. The ground-breaking proposal to hand-over the responsibility of generating and delivering the Unique Porting Code (UPC) to the neutral Mobile Number Portability Service Provider (MNPSP) post a real time cursory check of the compliance with portability requirements is revolutionary and will bear the desired result of effective and efficient porting process.

5. RJIL supports the revised porting process suggested by the Authority, however we feel that inherent contradictions in the existing porting process for Corporate connections continues to escape Authority's attention. We submit that the current process of porting corporate connections by generating individual UPCs, followed by letters by authorised signatory and restrictions on 50 porting under single letter has led to various abuses by DOs. We had submitted our proposal to treat a corporate connection as a single request earlier as well during the consultation process for draft

7th amendment to MNP Regulations. We hereby reiterate the proposal and expect a favourable and reasoned decision on the same.

6. RJIL believes that the reduced porting process timeline should adequately reflect in the validity of the UPC and the validity period of UPC should be reduced from prevailing 15 days to 4 days at the most. Reduced porting process timeline and reduced UPC validity period should also lead to discontinuation of existing provision of withdrawal of porting request. As under the new process considerable resources will be spent in generating the UPC itself and the transactions will be processed on near real time basis, the subscribers should not be permitted to withdraw porting requests. Of course, they will still retain the implicit withdrawal by not approaching a Recipient Operator (RO) even after submitting request for UPC generation.

7. RJIL firmly believes in implementing latest technology in telecom and supports the inclusion of the Blockchain technology in MNP process. The Blockchains are secure by design and resistant to modification of data and will therefore be a boon for data security as well. Further, as the MNPSP will also be handling a substantial amount of sensitive personal data, Blockchain implementation would be useful.

8. However, If blockchain platform is to be leveraged for the overall MNP implementation across Telecom Service Providers (TSPs), MNPSPs, and TRAI, then the TSPs would have to agree to the smart contract logic to be implemented, and also agree to a coherent format for data storage and information exchange between the TSPs, the MNPSPs and TRAI. For a smooth implementation, this can be done by the Authority or MNPSP proposing a possible initial solution followed by a discussion with the TSPs for further refinement to enable system integration in the respective networks of the TSPs. We are enclosing high-level discussion document for implementation of Blockchain technology as Annexure-A.

9. Further, RJIL concurs with Authority's view that the mobile numbers have been so well ingrained in our personal and financial dealings that the loss of the same can have catastrophic consequences. Consequently, we support the measures to address fraudulent porting and to extend a grace period for recovering the number post disconnection due to non-payment. We submit that although Aadhaar number would have been best to revalidating the credentials to address fraudulent porting, however due to virtual id process proposed by Unique Identification Authority of India (UIDAI), the Authority should use the name, gender, date of birth match to prevent fraudulent porting activities.

10. RJIL is also supportive of extending a grace period to retain the number to the subscribers losing their number due to non-payment. As the disconnected numbers

cannot be reused for a sizable timeframe post disconnection, we may extend the grace period benefits to the consumers for a maximum of 30 days.

11. To enhance customer experience, SMSs pertaining to MNP should be whitelisted i.e. there should be no charge to generate UPC to short code "1900" and after the implementation of revised process, no charge should be there to receive UPC message sent by MNPSP.

12. In addition to the review the process of Mobile Number Portability, keeping in view the importance of fixed line in accelerating broadband penetration in India and in order to rejuvenate fixed line sector, the Authority is also requested to prescribe the process for fixed line number portability. There is no reason to deprive fixed line subscribers from their vital consumer right.

13. Conclusion:

1.	**The Authority is requested to implement the revised process at the earliest to shorten the porting process timeline.**
2.	**Reduction in porting process timeline should also reflect in the validity period of UPC and the same should be reduced from prevailing 15 days to 4 days at the most.**
3.	**With the reduction of UPC validity period and shorter MNP porting period, provision for withdrawal of porting request can be done away with.**
4.	**The porting process for corporate connections also needs to be revised to keep pace with market realities and to cut the abuse. Corporate MNP on a single UPC generated by Authorised signatory should be implemented at the earliest and prevailing limit of only 50 connections at one go should be removed.**
5.	**The Authority should implement the new technologies like Blockchain to enhance the efficiency of the process and for data security.**
6.	**To enhance consumer experience, SMS pertaining to UPC should be whitelisted i.e. there should be no charge to generate UPC to short code 1900.**
7.	**The Authority is requested to introduce fixed line number portability.**

Issue wise response:

Question 1. Would it be appropriate that MNPSP be assigned the task of generating and communicating the Unique Porting Code (UPC) to the subscriber intending to port his mobile number as proposed in the consultation paper?

RJIL Response:

1. MNPSPs, by definition and by implementation are neutral players in the porting process. Under the current MNP process, as well, they have a sufficiently large and significant role and they have been carrying out the same efficiently barring minor glitches. Therefore, in the interest of smooth and timely delivery of this vital consumer right of MNP, we trust that MNPSPs can be assigned more responsibility in the process.

2. We understand that the proposed additional responsibilities of generating and communicating the UPC to MNPSPs will help provide faster portability and will address the issues of port-in rejections and mischievous issues with delivery of UPC.

3. This will also make the process more automated and minimize issues such as an early termination of the MNP process due to a wrong UPC code. This would also make the process neutral without favoring DO or RO. Having the MNPSP manage the UPC would streamline, automate and eliminate errors benefiting subscribers immensely.

Question 2. If you agree to assign the task of UPC generation to MNPSPs, whether the revised process outlined in the consultation paper is appropriate to address the relevant issues being faced in the existing MNP process?

RJIL Response:

1. RJIL has been a vociferous supporter of consumer rights vis-à-vis MNP in the past and we support all measures that simplify process, cut the porting rejections and minimize the time taken for porting process.

2. We submit that while the proposed process addresses all these issues, we would request the Authority to introduce more simplification in the process, by also adequately addressing the grey areas of corporate MNP and withdrawal of MNP.

3. We request the Authority to also implement a simplified consumer grievance redressal mechanism for MNP, in view of the increased role of the MNPSPs.

4. We also request the Authority to exhort all security agencies to move to the Centralised Monitoring System at the earliest, so that the new process could be implemented without much further ado.

Question 3. Do you suggest any other methodology which can address the issues being faced in the existing MNP process? Elaborate your answer.

RJIL Response:

1. The process can be further optimized to completely eliminate the UPC mismatch issues by leveraging the Blockchain technology. The UPC can be stored on a blockchain system as and when generated by the MNPSP. Subsequently, at the POS, the blockchain system can be queried for the active UPC for the mobile number associated with the subscriber. The response to the query can be used to automatically populate the UPC field in the CAF at the POS to avoid manual errors.

2. Another optimization that could be explored is to optimize the UPC generation process for subscribers for whom the DO is non-existent. In that case, it is presumed that the numbers associated with the DO are released to Number Range Holder. An online portal could be used for an eligibility check without UPC generation. At the POS at the RO, if the subscriber indicates that her/his DO is no longer in existence, then the MNPSP can query the Number Range Holder database to look for availability of the number, and then issue a UPC for the subscriber. However, since the DO's network / service is no longer available, no SMS is sent to the mobile number associated with subscriber. The subscriber could instead request the UPC to be sent via an SMS to an alternate mobile number specified by the subscriber or to an email address specified by the subscriber. If using a blockchain system for the process, the generated UPC, and the alternate mobile number for SMS or the email address used for communication can be recorded on the blockchain.

Question 4. How can KYC information available with DO be verified during the MNP process to avoid fraudulent porting? Please elaborate.

RJIL Response:

1. It is high time that effective measures are put in place to check the fraudulent porting activity. This problem has escalated post the closure of services by many TSPs.

2. Validating the Aadhaar number of the subscriber with the Donor Operator (DO) could have been the simplest solution, however with the impending implementation of 'Virtual ID' by the UIDAI this will be no longer suitable. The Authority can instead explore the option of verifying customer's name, date of birth and gender.

3. The MNPSP can collect this information from the DO along with the initial query. This information will reside with the MNPSP for the validity of the UPC. The MNPSP, on receiving the porting request from the RO, can verify the information before processing the porting. Verification of this data would not be difficult in case of eKYC subscriber verification, however there can be a few challenges in case the verification at RO and/or DO level is non-eKYC.

4. In case of paper CAF based subscriber verification, there can be issues pertaining to unavailability of correct 'date of birth' in rural areas and the possibility of subsequent changes in name. In such cases, the validation should be deemed completed if two of three parameters are matching, however, in case of higher mismatch the RO and DO may be asked to share the mobile number ownership credentials of the applicant to help the credential verification at MNPSP level to prevent fraudulent porting.

5. An eKYC Telecom blockchain system could be utilized to record customer KYC information to help with KYC verification across TSPs.

Question 5. What are the challenges in implementing the proposed MNP processes / framework on the part of stakeholders' viz. TSP (as DO and RO) and MNPSP? Elaborate your answer.

And

Question 6. Whether MNPSP should be compensated towards the cost of generation and delivery of UPC to the subscriber through SMS? If yes, what mechanism can be adopted?

RJIL Response:

1. As discussed in the general comments and replies to previous questions, we believe that the aim of changes in MNP process should be to make it faster, effective and

consumer friendly and to this effect minor and major implementation adjustments should be carried out at the earliest.

2. We understand that the on TSPs end the implementation is to organize a pull/push based mechanism under which all the initial information sought by the MNPSP should be made available at shortest time interval. This should not be a major concern as all of this information is generally readily available in subscriber database and CRM. Further this will also not require any significant investments by TSPs.

3. The challenge, if any in pushing this data to the MNPSP can be addressed by implementing an API arrangement. The other operational challenges can be the 24X7 availability of the data provisioning and validation, this can also be addressed by automation as many other activities are anyhow 24X7.

4. Other challenges can be the default UPC generation in case of planned/unplanned downtime at the DO end, however, this can be addressed by a broadcast of such downtime to MNPSP, so that the default UPC are not generated in this period.

5. We understand that major developmental change and increase in responsibility would be at the end of MNPSP. The MNPSPs should be compensated towards the additional work done, following the existing principles adopted for their compensation. For this purpose, the Authority can also verify the costing estimates submitted by MNPSPs through independent auditors.

6. In order to enhance customer convenience, we propose that the SMS pertaining to MNP should be whitelisted. There should be no charge for sending a SMS to generate UPC to short code 1900 and in turn the TSPs should also not charge for the UPC message received.

7. We submit that, as is the existing practice, RO should cover the MNP costs for all the customers whose acquisition was successful, thus the per port transaction charge may be revised appropriately. As it is unlikely that more than a small fraction of porting requests will be rejected in the revised process, thus the per port transaction charge should be fixed on successful transactions only.

Question 7. What would be the appropriate mechanism to reinforce the accountability and role of MNPSP in the proposed scenario?
And
Question 8. What could be the mandatory obligations on part of the MNPSP?

RJIL Response:

1. Under the proposed MNP process the MNPSP will have the most critical role of customer interaction, besides its original role of Mobile Number Portability Clearing House (MCH), Number Portability Data Base (NPDB) and database query response system. Under this role it will be responsible for default or near-default processing of portability requests for a very large segment of prepaid telecom subscribers.

2. Its additional responsibilities will include Receiving UPC request; Query Response form DO/RO; Generating the UPC; Sending the UPC by SMS; Validating UPC content and validity upon porting request; processing the porting requests. As most of these activities will have to be performed on real-time basis, it is imperative that certain quality of service (QoS) standards should be prescribed.

3. Further, The MNPSP will be required to act as a neutral entity enabling mobile number portability in an auditable manner. It will also be handling a large amount of sensitive personal customer data, thus it is imperative that certain data privacy obligations be imposed on it by means of a license amendment.

4. The MNPSP's additional responsibilities should also include periodic reports generation, as prescribed by TRAI.

Question 9. In the event of large scale disruption or sudden shutdown of network, what could be the appropriate alternative mechanism to ensure delivery of UPC and completion of porting process?

RJIL Response:

1. Large scale disruptions or shutdown of network should not impinge the porting process. The MNPSP should be instructed to issue unique subscriber name and mobile number specific UPC codes that can be available on validation to all subscribers. Post this the normal porting process can run.

2. One additional measure, at time of network shutdown, can be to implement a short duration mandatory Intra circle roaming (ICR) arrangements between the service

providers to enable continuity of service to customers. The ICR instructions for this can be issued by Department of Telecommunication on Authority's recommendations. The subscribers can be advised to opt for the service provider of their choice through MNP. The Authority can also waive off most of the porting restrictions in such cases to facilitate the subscribers.

Question 10. (a) Do you agree with the process for transfer of the prepaid balance to the subscriber's account as described in the consultation paper? What changes do you envisage in licensing/ regulatory framework to enable the provision? Please elaborate your answer. (b) If the above process is not agreeable, please suggest alternate mechanism.
And
Question 11. What should be the regulatory requirements to monitor efficacy of the provision of transferring the unspent pre-paid balance? Please elaborate your answer.

RJIL Response:

1. We do not agree with the proposal to transfer of prepaid balance on porting. The primary reasons is that this would entail unnecessary inter-operator issues and major development for minor amounts.

2. Further, with the changed paradigm in prepaid pricing, the subscribers generally get entitlements in the form of free voice, unlimited data etc. in prepaid plans and vouchers and the subscriber would anyhow get these benefits on porting, as they have to enroll with a plan offered by DO to complete the porting.

3. Plus a variety of tariff plans across the operators would imply that a humungous and impossible exercise would be required to find the conversion factors to transfer the prepaid entitlements.

4. Talktime vouchers do not hold the prominent place in prepaid recharges as before and the cost of transaction would far outweigh the actual transfer amount, therefore even the basic cost-benefit analysis would negate this proposal.

5. The prepaid customers are well-informed that they will not be carrying forward the balance amount on porting and this new proposal, if implemented, will entail new learning for them as well leading to unnecessary spurt in consumer complaints.

Question 12. In the proposed scenario of reduced MNP timelines, should the validity of the UPC be reviewed? If yes, what should be the period of validity of UPC? Please elaborate your answer with justification.
And

Question 13. Whether it would be appropriate to review the existing structure of UPC? Please elaborate your answer with justification.
And
Question 14. If you agree to above, does the proposed structure as discussed above adequately serve the purpose or would you suggest any other mechanism? Please elaborate your answer with justification.

RJIL Response:

1. UPC validity has to be reflective of the time taken in actual porting. Under the proposed process, the porting will happen in 2-3 hours for a majority of porting requests.

2. Only in the cases of corporate connections and contractual obligations, the MNPSP will be sending the porting request for approval to DO. We submit that the Authority should limit the turnaround time for DO for these approvals to 24 hours instead of one working day as proposed. This will imply that porting process would extend over one day only in case of corporate numbers and contractual obligation cases. Thus the maximum porting time would be 2 days in all service areas.

3. Thus clearly there is no need of continuing with the current validity period of 15 days and the UPC validity can be reduced to 4 days at the most.

4. The current structure of UPC should suffice. The reduced validity period of UPC would further boost the UPC resources availability due to its recyclable nature, thus no changes are proposed in the existing structure of UPC.

Question 15. Should the provision of withdrawal of porting request be done away with in the revised MNP process? Please state your answer with justification.

RJIL Response:

1. The short UPC validity and shorter MNP porting period would imply that the subscribers have to make up their mind before initiating the request. The subscribers would, of course, have sufficient time to change their mind before approaching a RO and that should be the end of it.

2. As the Authority is aware the permissibility of withdrawal of porting request by the subscribers has metamorphed into the nefarious practice of surreptitious segmented and retention offers. This practice has affected the very fabric of the regulatory

oversight in telecommunication. Removing the provision of withdrawal of porting request would be one way to address this issue.

3. In view of the above, we agree that the withdrawal of the porting request can be done away with. As mentioned above, If the customer generates a UPC, but does not follow up with the RO, then the UPC will become invalid after a few days, thus even though the explicit withdrawal of porting request will be removed, the implicit withdrawal by means of expired UPC will remain to protect consumer rights. However, if the customer does follow up with the RO at the POS of the RO with the eKYC process initiated, then it is assumed that the customer has taken an informed decision, so that the process can be completed with a fast turn-around time in the new process.

Question 16. What additional changes do you envisage in the MNP regulations? Elaborate your suggestions.

RJIL Response:

1. We submit that it is high time that the porting of corporate connections is not left to the vagaries of DO. As also mentioned in our submissions to previous consultations on MNP Regulations, the corporate connections are by definition the connections owned and paid for by the Corporate with no individual ownership of mobile numbers. Therefore the decision on the porting of such connections should also be a corporate decision, therefore one UPC for all corporate porting connections should be sufficient.

2. We would once again bring your attention to the fact that the Authority in the 5th amendment to MNP Regulations dated 22.07.2016 had discussed the issue of providing Corporate MNP on a single UPC generated by the Authorized Signatory of the company, however it did not implement the same as this required a change in the existing framework, where the UPC for the porting should be generated only by the porting mobile number. We submit that as the Authority is now revising the entire porting process, this change should also be implemented.

3. Further, the current subscriber verification instructions do not put a limit on the number of subscribers for a corporate customer, therefore all the required connections can become subscriber at one go under a single CAF, however the MNP limitation of the 50 numbers at one go puts unreasonable restrictions on a corporate seeking to move its connections to another service provider.

4. We further submit that this limitation on bulk porting process leads to various ancillary issues. The limit of 50 numbers imposed on a single porting request has become a major pain point for the Bulk porting requests by larger groups. The faulty and

arbitrary implementation of this provision by the Donor operators leading to rejection causes enormous discontent and wastage of resources. Sometimes a request for all numbers is rejected for even one UPC mismatch or outstanding against one number. Thereby leading to a situation where the porting by a large corporate becomes a humongous exercise, stretching into many months. The only party that really suffers in this case is the Corporate that wanted to port out, for a long period of time it is required to bear with the services of the Donor operators for no fault.

Question 17. Due to the difficulty envisaged, should the subscriber be allowed to reconnect his mobile number even after number return process is initiated? If yes, what could be the criteria? Please elaborate suitable method.

RJIL Response:

1. We agree with the Authority's view that a mobile number is much more than a mere number these days as it is intrinsically connected to our personal and financial transactions. The mobile number is also a critical cog in the wheel for financial inclusion targets of the Government. Thus there should be some additional leeway for the customer's to retain their number.

2. The current prevailing DoT instructions entail a disconnected number cannot be recycled for 90 days. Further, the MNP regulations provide for a 60 days window for initiating number return. These timelines indicate that there is a possibility of giving some relief to the customers with numbers disconnected due to non-payment.

3. Thus the subscriber may be given a grace period of maximum 30 days post the expiry of notice period to make good the payment obligations to the DO. We recommend that if the subscriber makes a payment after disconnection subsequent to a notice period, then the system should be able to return the number to the subscriber.

4. However, the Grace period should necessarily be terminated prior to initiation of number return process. Once number return initiated and the MNPSP issues the transfer date/time to revert the number to original number range holder (ONRH), the number should not be permitted to be reconnected.

5. With the newer faster process, it is anticipated that the duration of usage after an interim-bill payment by a post-paid subscriber will be very short, so that the payments due would be small. The system should allow adequate time to make the payment, and should be designed such that the subscriber does not lose her/his mobile number due to the NPD request.

Question 18. Should the MNPSPs be allowed to charge for the ancillary services such as number return and bulk database download by TSPs? Please provide your comments with justifications.

RJIL Response:

1. The proposal to charge for the ancillary services such as bulk database downloads is valid, basis the appropriate cost analysis. The MNPSP is license bound to maintain consistency of information in the system, however he Authority may analyze the cost of resources diverted to bulk downloads, as approximately 5000 downloads per year is a substantially large number and is equivalent to a daily bulk download by the operators.

2. We submit that linking a cost element to these downloads will impact frivolous download activities as well. On the other hand in case this daily download is actually desirable then MNPSP should deploy adequate dedicated resources to provide this service with agreed SLAs and appropriate charge. Hence we support a reasonable charge for such ancillary services provided by the MNPSP.

Question 19. Would the new technologies, such as blockchain, be helpful for facilitating faster and transparent MNP process? What can be the possible advantages and challenges? Please elaborate.

RJIL Response:

1. We support the use of blockchain technology for the MNP process. The DO, RO, and the MNPSP can share the status of the MNP porting request for a subscriber on a blockchain platform with each other.

2. With Blockchain technology in place, the Authority can access the blockchain platform to study and audit of the MNP process at any time. The subscriber can query the system to obtain the status of the request at any time.

3. Smart contract code or chain code can be provided on the blockchain platform to record the logic utilized to process the MNP request at various stages of processing of the request. Blockchain-based technology can also be leveraged to share relevant subscriber information across operators, if required.

4. The implementation of Blockchain technology will lead to full transparency, traceability, auditability, and a significant reduction in processing time to improve overall subscriber experience with the MNP process, and to improve overall

efficiency. The immutability of data on the blockchain would also be very useful from a regulatory standpoint. In addition, with the MNPSP-centric process on the blockchain, the MNP process moves to a more neutral fair process for mobile number portability, rather than a typical DO-driven or RO-driven process.

5. Besides blockchain technology, as was also mentioned in the consultation paper, new technologies such as NFV (Network Function Virtualization) and SDN (Software-Defined Networking) can provide support for blockchain-based MNP services to be hosted in virtual machines or containers in distributed cloud and edge systems, with high availability, reliability, and scalability. In addition, messaging systems can be used for proactive communications across various parties, and machine-learning/analytics techniques can be utilized to study the observed data in the system to further explore possibilities for the improvement in the efficiency of MNP processing in the system

Question 20. If there are any other issue(s) relevant to the subject, stakeholders are requested to offer comments along with explanation and justifications.

RJIL Response:

1. As highlighted during our previous submissions as well, RJIL has observed that when a mobile number series previously assigned to an operator in one LSA is reassigned to another operator in a different LSA post surrender of series by the previous operator. The Number range holder (NRH) details like Operator ID (OID) and licensed service area (LSA) are updated with the MNPSP and service provider's number portability gateways (NPGW). The number series is also updated with new LRN as per the DoT letter. However, the complete NRH details are not updated for the already ported mobile numbers with the MNPSPs.

2. For such numbers when a port broadcast is received with MODIFY command with NRH (OID, LSA) and current (OID, LSA) operator parameter values, there is a mismatch in port updating logic (which matches current OID and LSA with NRH OID and LSA) at NPGW since NRH LSA value is still reflecting as old operator LSA and cannot be validated from broadcasted values since NRH LSA is not sent as a broadcast parameter leading to a delayed or rejected transaction.

3. We submit that this issue can be easily averted by ensuring that any change in Number series is intimated to MNPSP along with the service providers simultaneously. Further, all changes in the ported database should be broadcasted by the MNPSP post making all necessary changes in its ported subscriber database to all service providers ,for uniformity in operator Databases. Additionally both the NRH OID and LSA should be

broadcasted with MODIFY command, post making necessary changes in the ported number database with MNPSPs. This will help ensure that the subscribers do not face unnecessary hardships. Another interconnected issue is of a few never-ported, active numbers being still with the original assignee of the series at the time of reallocation of the series. The necessary suitable changes in the MNPSP database and broadcast in similar manner as in the above mentioned case will help resolve this issue as well.

4. We have observed a few cases where a temporary issue at service provider's end led to deactivation/deletion and return of a ported subscriber's number. In such a scenario, if MNPSP sends a broadcast of number return to all service providers then there is a possibility of subscriber losing his number permanently and he may be forced to reactivate the same number with NRH to retain the number. Generally, such issues are resolved post DoT approval and manual changes made by the service providers, however this impacts the incoming call facilities for the subscribers till all service providers have updated the database. Further, this exposes the service provider's system to manual intervention and associations issues. However, this can be easily averted if the updation of changes in ported subscriber Database, post applicable DoT approval, are initiated by the MNPSP by a broadcast instead of offline manual updates.

5. We would also highlight the fact that the number return process is not well defined for the service providers, whose licenses have been cancelled/expired. As per the existing process, on a number return request, the numbers are returned to the Original NRH. However, there is a possibility of a wrong number return request initiated by RO and if the number belongs to a licensee with cancelled/expired license and the numbers are currently not allocated to any other service provider then it is not possible to get that number back. We suggest that in such cases MNPSP should support re-Broadcast of the number to all service providers post DOT approval provided by RO to help the aggrieved subscribers.

6. We request the Authority to also prescribe the process for fixed line number line portability. The Fixed line number portability is no different than mobile number portability and with the technological advancements, there is no reason why the fixed line subscribers be deprived of this vital consumer right. As the Authority is aware that the increased fixed line penetration will lead to more broadband penetration, thus fixed line portability will also be vital to incentivize broadband proliferation. Further, the introduction of fixed-line portability will incentivize investments in fixed line business further boosting the broadband penetration.

ANNEXURE-A

Mobile Number Portability with Blockchain Technology

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Table of Contents

1 Document Purpose

The document suggests details on enabling Mobile Number Portability using permissioned blockchain technology.

2 Overview

Mobile Number Portability is a mechanism to transfer a mobile number from a Donor Operator (DO) to a Recipient Operator (RO) based on a request from a mobile user for such a transfer. Mobile users typically suffer a lot of anguish during such a transfer due to a lack of adequate transparency in the process. Such a transfer can get stalled or delayed for one or more reasons causing discomfort to the mobile user that is requesting the transfer. The goal of this document is to leverage blockchain technology to accelerate the mobile number portability process. The focus is on the DO-led MNP process in India. However, the treatment is generic enough to be applicable in other countries and for RO-led MNP processes as well.

The key participants in the MNP process are:

1) A Mobile Customer
2) A Donor Operator
3) A Recipient Operator
4) An MNP Clearing House (MCH)
5) A Payment Gateway
6) TRAI (Telecom Regulatory Authority of India)
7) The Department of Telecommunications (DoT)

On the Blockchain system, the DO entities interface via a DPA (DO Processing Agent), the RO entities interface via an RPA (RO Processing Agent), while the mobile customers, TRAI, and the DoT interface via the neutral MNP-SP node on the Blockchain. It should be noted that the responsibilities for the MNP-SP node have been expanded to participate in Blockchain related activities as will be described in subsequent sections.

3 Technology Assessment

3.1 Benefits of Blockchain

The proposed Blockchain system will provide transparency to all participating entities in the system, including the mobile customers, regulatory authorities, MNP-SP and TSPs with process automation it will be helping speed up the overall process. This will increase customer flexibility to switch the network in hassle free manner which in turn result in competitive pricing for customers. Lesser manual intervention will optimize the backoffice processing cost for the operators and MNP-SP.

3.2 Impact on Current Systems

There would be a need for system integration with existing systems (e.g. at TSP end with the new MNP Blockchain Platform. However, it is anticipated that such a requirement would be minimal as similar Integrations exists in current MNP processes.

3.3 Non-Functional Requirements

3.3.1 Performance

All system calls should be responded within one sec delay for SMS and within 100 ms on any user facing applications build on top of it.

3.3.2 Monitoring and Auto Scalability

System should be designed with a target of 99.99% availability with the support for horizontal auto scaling with minimum zero down time and without any manual intervention. Monitoring systems should be in place to auto deduct any bad nodes and launch a new node to manage system availability.

4 Detailed Call Flows

4.1 MNP Call Flow

Following is the Proposed MNP process in response to TRAI consultation paper (Refer Section 8 for reference). Following Entities will be involved in the process.

1. Subscribe (Customer will initiate Porting Request)
2. Donor Operator (Existing Service Provider for subscribers)
3. Recipient Operator (Destination TSP for MNP request)
4. MNP-SP
5. CMS (Newly proposed Centralized Monitoring System at DoT end)

4.1.1 UPC Code Generation flow

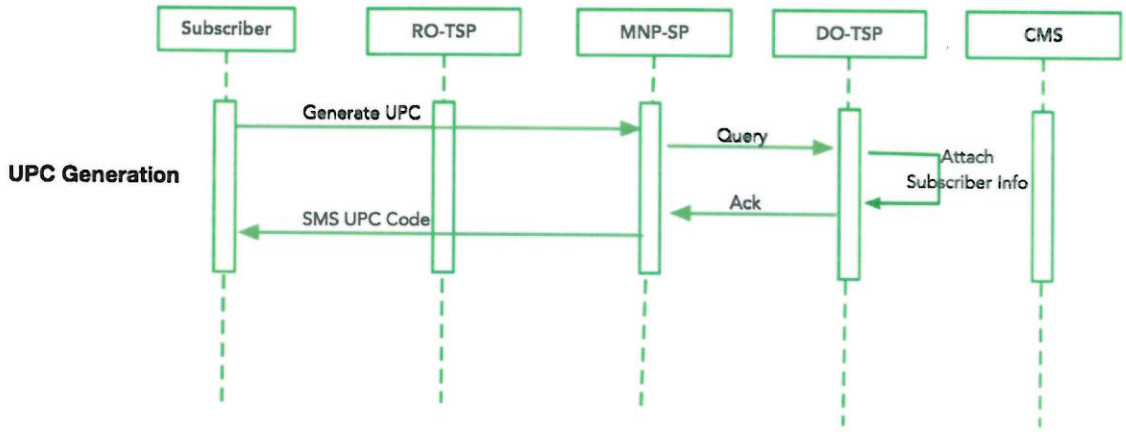


Figure 1: UPC Generation Sequence Diagram

- **Step 1:** Subscriber initiates request for UPC code generation from one of the channels e.g. SMS, Web for MNP-SP.
- **Step 2:** MNP-SP in return calls DO-TSP to authenticate subscriber details, authenticate MNP eligibility and get subscriber details to attach with MNP Request.
- **Step 3:** If step two validate MNP eligibility DO will generate the UPC Code for subscriber else will get the reason for MNP Rejection and respond to subscriber with the same.

4.1.2 *CAF with eKYC*

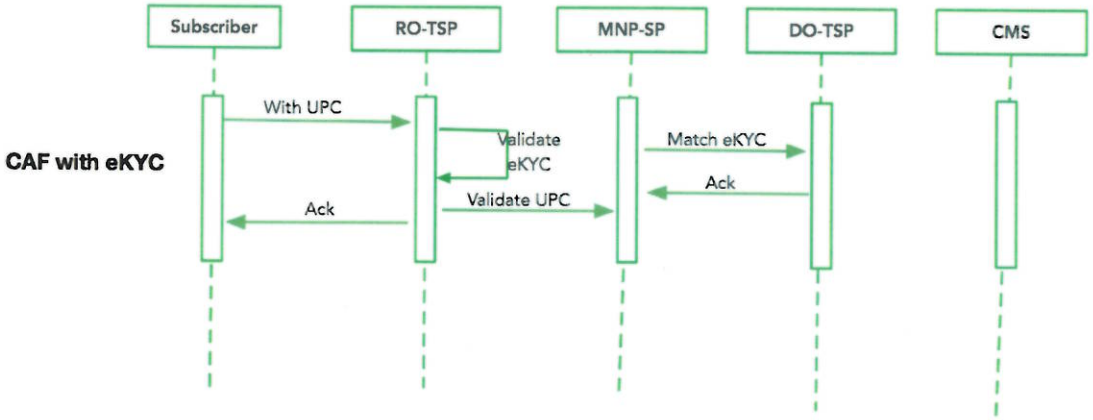


Figure 2: CAF and eKYC generation Diagram

- **Step 1:** Subscriber initiates CAF request along with UPC code at Recipient Operator's POS and initiates eKYC request to port Mobile # to RO network.
- **Step 2:** RO completes the eKYC process and updates the Blockchain channel with operator with eKYC confirmation status.
- **Step 3:** In Parallel to eKYC validation RO invokes UPC Validation at MNP-SP end, once eKYC and UPC requests are validated consolidated acknowledgment is sent to subscriber.

4.1.3 *MNP Clearance*

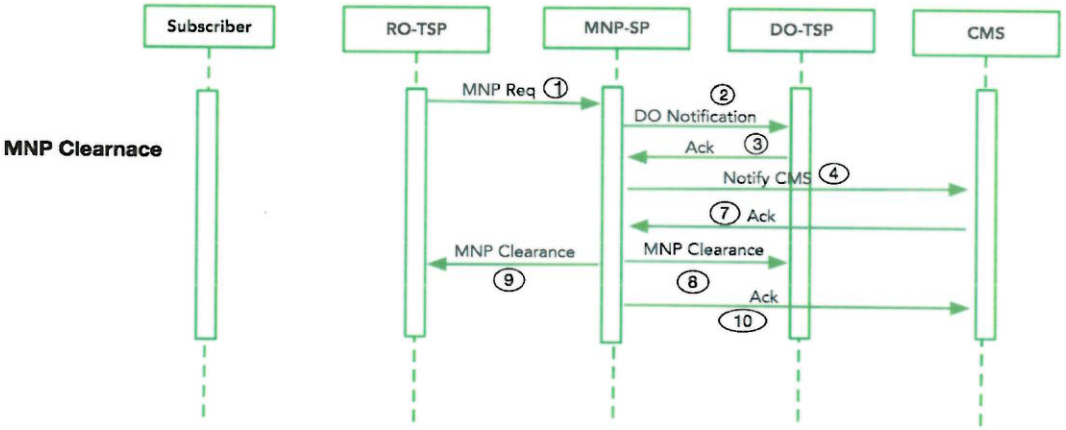


Figure 3: MNP Clearance Sequence Diagram

- **Step 1:** After successful completion of eKYC steps, RO initiates MNP Request with MNP-SP.
- **Step 2:** MNP-SP based on available customer information (fetched in step 2) of 4.1.1, approves/rejects the porting request.
- **Step 3:** The approval/rejection shall be notified to the DO. Subscriber is also notified through SMS.
- **Step 4:** The MNPSP sends a notification along with RN and new operator ID to the CMS if the porting request is approved. CMS acknowledges the same.

4.1.4 *Porting Completion*

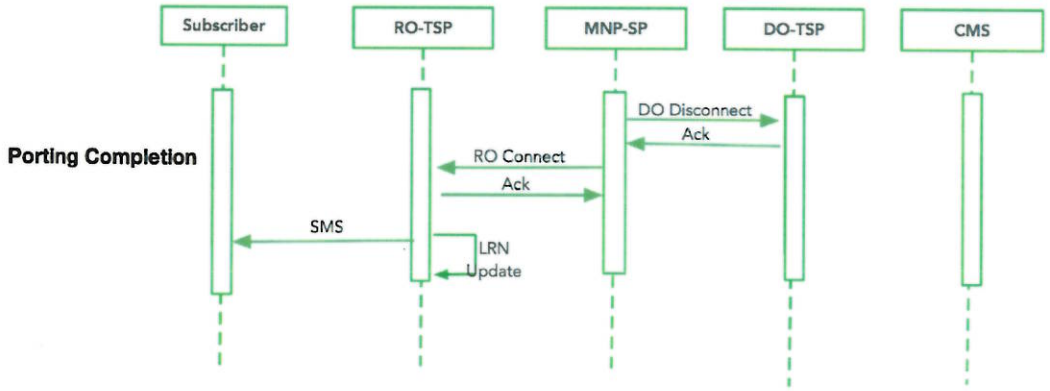


Figure 4: Porting Completion Sequence Diagram

- **Step 1:** On successful clearance from MNPSP for porting, the MNPSP initiates a disconnection request on Donor operator network, after disconnection donor sends back the acknowledgment.
- **Step 2:** MNP-SP sends Connection request to RO. After successful connection @RO, it sends an ACK.
- **Step 3:** MNPSP broadcasts the new LRN to all the TSPs and the CMS so that CMS can purge the older routing data wrt the porting subscriber.

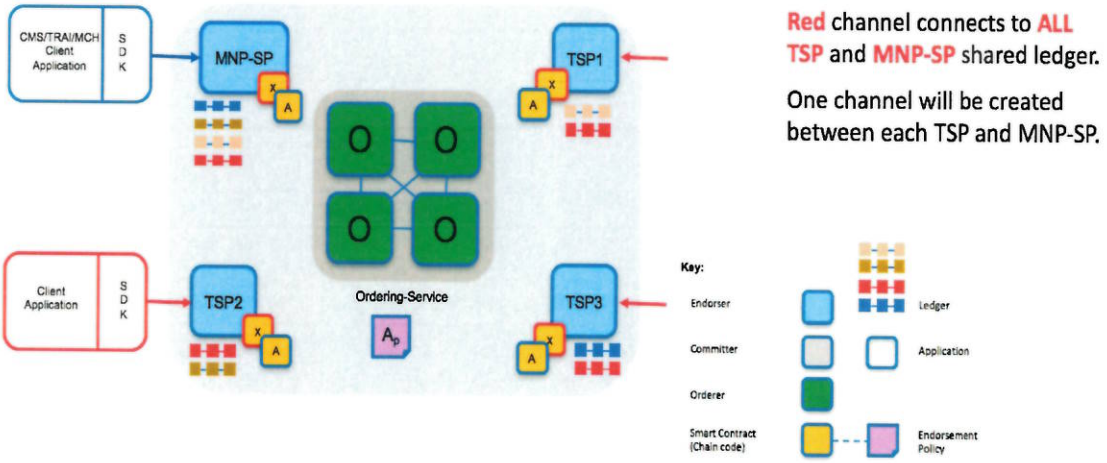
5 Architecture

5.1 High Level Architecture

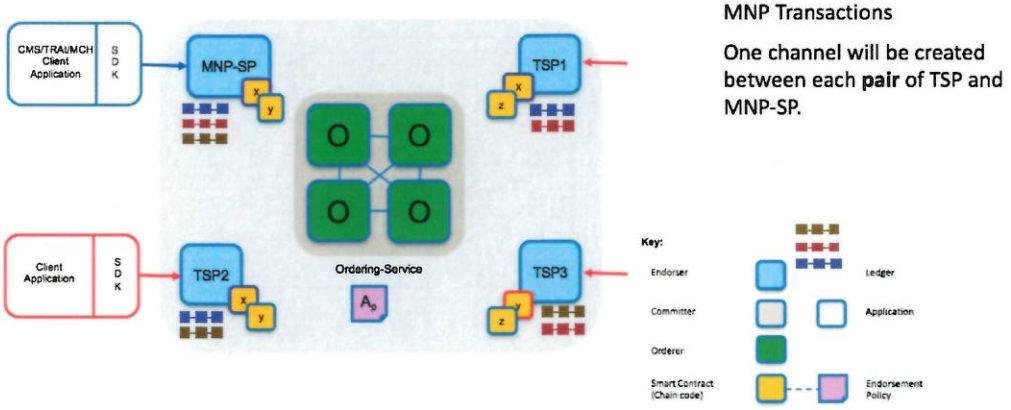
Following is the proposed architecture for the MNP on the blockchain platform. Distributed MNP System will have 2N+1 Peer Nodes (in a network of N, TSPs), as part of the distributed ledger, following channels will be create as part of MNP network design.

1. One channel is created to share the ledger between MNP-SP and all the TSPs to share the common information with every one e.g. messages related to LRN updates, number range for different operators etc.
2. N channel will be created one between each MNP-SP and TSPs. Individual Channel will be used to have the shared ledger about sharing Subscriber information like eKYC status, number range for MNP, UPC Code generation etc. between TSP and MNP-SP.
3. Another set of N(N-1)/2 channels will be created between each pair TSP and MNP-SP (e.g. MNP-SP, TSP1 and TSP2). This will be the main channel where MNP Transaction will be processed and go through different stages during processing stage.

MNP Proposed BlockChain Architecture



MNP Proposed BlockChain Architecture



5.2 Peers

- Central Peer Maintained by MNP-SP (Apps will be built on this DB for CMS/TRAI and MNP-SP)
- One peer should be maintained for each TSP

5.3 Assets

- Mobile Number (MSISDN)

5.4 Transactions and Endorsers

The transaction details for the proposed process flow is explained in section 5. In the MNP network, MNP porting request is the root transaction. Based on the Phase and Operation on the Transaction different peers will act as the Endorsers.

UPC Generation:
Submitter: DO
Endorser and Committer: MNP-SP, DO
Orderer: MNP-SP

eKYC and CAF Completion:
Submitter: RO
Endorser and Committer: RO, MNP-SP, DO
Orderer: MNP-SP

MNP Request Initiation:
Submitter: RO
Endorser and Committer: RO, MNP-SP, DO
Orderer: MNP-SP

MNP Clearance:
Submitter: RO
Endorser and Committer: RO, MNP-SP, DO
Orderer: MNP-SP

5.5 Endorsement Policies

Endorsement policies will be used to instruct a peer on how to decide whether a transaction is properly endorsed. When a peer receives a transaction, it invokes Validation System Chaincode (VSCC) associated with the transaction's Chaincode as part of the transaction validation flow to determine the validity of the transaction. Recall that a transaction contains one or more endorsement from as many endorsing peers. VSCC is tasked to make the following determinations:

- all endorsements are valid (i.e. they are valid signatures from valid certificates over the expected message)
- there is an appropriate number of endorsements
- endorsements come from the expected source(s)
- Endorsement policies are a way of specifying the second and third points.

5.6 Orderers

Ordering service Node will be maintained at MNP-SP, this will bind entity for all the members of the blockchain network with cryptographic identity of all peers. Ordered node will sequence the transaction proposal endorsed by other peer Nodes for committing into blockchain.

5.7 Channels

In the proposed MNP Design there will be total of [N(N-1)/2+N+1] channels, one channel will be created for each pair of operator and MNP-SP to share the MNP requests, one channel should be created between MNP-SP and all the operators for a shared ledger for auditing, monitoring and sharing of number range and one channel between MNP-SP and TSP.

5.8 Certificate Authorities & Digital Signatures

MNP-SP will host the MSP and ordering service, MSP will have the ownership to generate and maintain membership root certs, signing certs, keys for all the participating members and admins.

CA will govern identity of Peers, users and applications. It will provide user and application identity certificate generation and maintenance, authentication and authorization for System Integration, Channel and Chaincode ACLs.

5.9 Distributed Apps

Distributed Apps will be built for network participants like Mobile number subscriber, MNP-SP, TRAI, TSP and CMS etc. which provide role based access to blockchain network to manage the lifecycle of an MNP Request. View performance of system in terms of reporting on SLAs and business reporting.

5.10 High Availability

In order to achieve the high availability and fault tolerant solutions, Blockchain participant Nodes will be deployed in a cluster with appropriate replicas and GR, DR nodes for each participant Peer Node.

6 References

TRAI Consultation Paper
https://trai.gov.in/consultation-paper-review-mobile-number-portability-mnp-process