



## Parameter Effecting Mobile Number Portability And Fuzzy Logic Based MNP Decision

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**Abstract:** Mobile number portability (MNP) means that a subscriber of one telecommunication operator is able to keep his telephone number unchanged when switching to another operator. As one of the development trends of the international telecommunication industry, number portability has been introduced in many countries around the world and has played an important role in stimulating the competition and development of telecommunication market. This paper describes various parameter that effect subscribers or parameter on which MNP depends and MNP decision using fuzzy logic.

**Key words:** MNP, Parameter, Fuzzy Logic.

### I. Introduction

Number Portability refers to the ability of end users to retain their telephone number when they change their network operator/service provider, their location, or their service[1]. If the subscribers are not satisfied with the services of their service provider, they can change their service provider while retaining the existing phone number. This infuses competition among service providers and forces them to improve their service standards to satisfy subscribers. There are three number portability services Operator portability, Location portability, Service portability.

**Operator portability:** It refers to the ability of an end user to retain the same telephone number when changing from one operator to another. It is also referred to as 'service provider number portability[1]'.

**Location portability:** It refers to the ability of an end user to retain the same telephone number when changing from one physical location to another without necessarily changing their operator[1].

**Service portability:** It refers to the ability of an end user to retain the same telephone number when changing from one type of service to another without necessarily changing their operator[1] (e.g. from old telephone service to ISDN).

### II. Parameter That Effect Mobile Number Portability

Most of the customer switch their operator because of network coverage of the operator, customer care services, tariff plans etc. The parameters due to customer switch their operators are:

- a) Billing
- b) IDD Services
- c) Convenience of bundled services
- d) 3G Services
- e) Better offers/ promotion
- f) Better customer care services
- g) Network coverage
- h) Tariff plan

**2.1. Billing:** Billing is one of the major parameter for mobile subscribers to change their network operators. There are some points due to which subscribers change their network operator services for example, a business man who is worried about his bill because if he makes large no of calls in a day and per call cost is larger than he opts for the operator whose call rates are low.

**2.2. IDD Services:** The IDD service means International Direct Dialling. The nation's number one integrated communications service provider announced its reduced International Direct Dialling (IDD) charges for its valuable customers throughout the nation. IDD services provide connectivity to the highest number of countries whilst having direct communication routes to more than 225 destinations. As the largest external gateway operator in the country, IDD services are designed to meet the communication needs of the business community, public services, social networking communication as well as migrant workers and their loved ones. With this tariff reduction, TRAI will be in a position to enhance the capabilities of those communities by facilitating them in terms of quality, reliability and cost effective connectivity. Making IDD calls will now be more cost effective and convenient for customers, with the company taking great strides in further enabling interaction among relatives, family members and business communities in India as well as overseas..

**2.3. Convenience of bundled services:** These days, nearly every telecommunications company is offering, or considering offering, bundled services to attract new customers, increase retention of current customers, or both. Every time I turn around, there seems to be a new variety of bundled services. Quality, ease of use, and the right price points in a market, make these bundles very attractive to consumers.

Almost every operator has some package or scheme revolving around economical calls routed to the number of your near and dear ones. Most telecoms provide facility of calling at cheaper rates on particular set of mobile numbers on paying certain subscription charges. Other things remaining constant, you can also compare between such packages offered by various telecoms; as these are the numbers you are most likely to frequently dial to stay in touch with your family and friends. Mind it; it can save a substantial chunk of your bucks. As technology blurs the lines that once divided providers of voice, data and video services, communications companies are responding with attractive offers that "bundle" a variety of services into a unified package with, in most cases, substantial savings over the cost of ordering the same services individually or from different suppliers.

**2.4. 3G Services:** 3G Services means speed does matter. Most of the larger telecom companies have spent big fortune on winning crucial next generation 3G airwaves. The new 3G technology will ensure fast-paced internet connection at broadband speed even while on a move. Most of the telecom operators are gearing up for a quick roll-out of these premium services in February. Those geeky subscribers who are addicted to mobile internet might do well to wait a bit until the third generations services are up for the grabs. Once rolled-out, compare the service and make your decisive move.

**2.5. Better offers/ promotion:** Mobile value added services are innovative set of mobile applications serving beyond basic voice and messaging services. These include high-end services such as entertainment (chats, video downloads, ring-back tones), gaming, multimedia content delivery and conferencing services to name a few.

Internet through GPRS / EDGE is the latest craze among youngsters who love to dabble on social networking sites to interact with their online friends and colleagues. If you're looking to axe your current operator and shift to some cost-effective new entrant in the industry, be sure that they provide good user-experience for such premium value-added services.

**2.6. Better customer care services:** Once you're able to access network coverage, quality of the service provided by the Telco is of utmost importance. Its service aspect includes state-of-the-art service centre with advanced customer care department designed to provide superior customer management services. While the telecom-industry is growing at a rapid pace it becomes significant to determine whether the service provider has ample call centers to deal with customer complaints and resolve their problems during recent years the importance of providing the highest level of customer care has grown significantly. Organisations now realise that effective customer service is the key to obtaining a competitive edge and increased efficiency. Most major surveys undertaken in recent years point to customer care as being a primary factor in customer retention and business expansion.

To ensure that quality of service is maintained competency in the core technical skills of any role that falls within the customer relationship is no longer enough. Without the appropriate skills to enable staff to handle customers professionally – customers will label service as poor and seek to transfer loyalty to organizations, which are perceived to be genuinely concerned on their behalf. No two organizations are the same, and in line with our flexible cost effective approach to training, Perpetual Solutions have developed a series of customer service modules from which organizations can 'pick and mix'. This enables you to form the perfect customer service training solution for the requirement you currently face. The modules are grouped into four main areas, Customer Care, Difficult Customer, Difficult Situation, and Communication.

**2.7. Network coverage:** This reminds me of the innovative Hutch Dog ad campaign which just follows you everywhere. So, network coverage should certainly be on your top priority list to determine your decision as to whether you should stick with your current operator or not. At times, it could be possible that the network of a particular telecom operator X is just fine. But, since your office or home is situated in interior corner of the building, the coverage cannot reach you. In such a case, you are left with no other option but to bid good-bye to your current service provider irrespective of its service quality. However, before you ditch your current mobile operator; do ensure that airwaves of the service provider with whom you're looking to convert into does reach you.

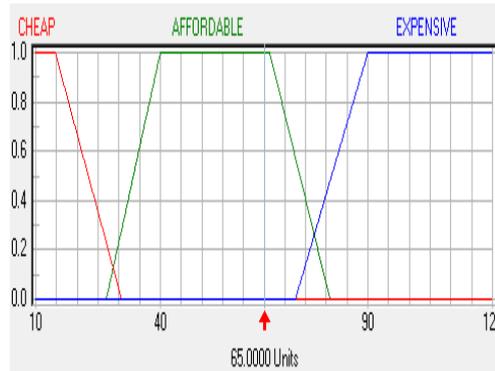
Although there are cell phone base station tower networks across many nations globally, there are still many areas within those nations that do not have good reception. Some rural areas are unlikely ever to be effectively covered since the cost of erecting a cell tower is too high for only a few customers. Even in high reception areas it is often found that basements and the interiors of large buildings have poor reception.

Large buildings such as warehouses, hospitals and factories often have no usable signal further than a few metres from the outside walls.

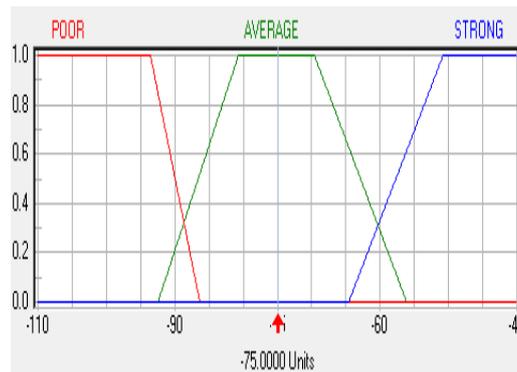
**2.8. Tariff plan:** No points for guessing what the fuss was all about in the telecom industry for last couple of years. It was regarding ultra-competitive tariff rates. Each telecom operator was trying to pip other in terms of introducing 1 second plan to ½ second plan and even fraction-of-a-second plan. Needless to say, tariff plans offered by your current mobile operator should be comparable to the ones prevailing in the market, if not lower. The days of monopoly in the wireless segment are way behind us. Make every rupee count.

**II. Mnp Decision Using Fuzzy Logic**

In actual there are many parameters to switch their operator but practically tariff plan, customer care services and network coverage parameters are more important for a customer to switch their operator. Now we are taking three parameters tariff plan, customer care services and network coverage for MNP decision using Fuzzy Logic. On the basis of these three parameters we are deciding MNP is to be done or not. Here tariff plan, customer care services and network coverage are input parameter and MNP is output parameter. Input parameter tariff plan gives the information of call rate per paisa. In this we are taking tariff plan from minimum 10 paisa per call to maximum 120 paisa per call. The whole range is distributed in three levels cheap, affordable and expensive. The membership function of tariff plan is as shown in fig.1. The second input parameter is network coverage that gives the information of network coverage at the boundary of cell and taking signal strength from minimum -110 db to maximum -40 db. The whole range is distributed in three levels poor, average, strong. The membership function of network coverage is as shown in fig.2.

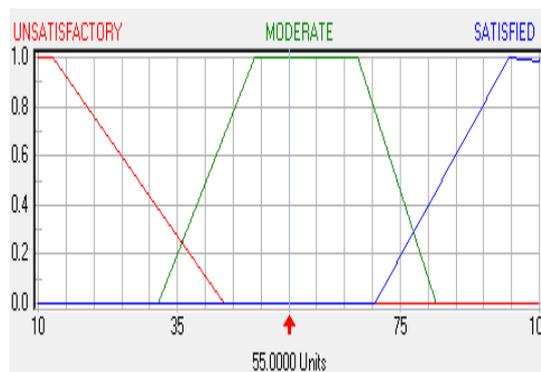


**Fig:1. Membership function of tariff plan**



**Fig:2. Membership function of network coverage**

The third input parameter is Customer care services that give the information of subscriber satisfaction. In this we are taking customer satisfaction from minimum 10 % to maximum 100 %. The whole range is distributed in three levels unsatisfactory, moderate and satisfied. The membership function of customer care services is as shown in fig3. The output parameter MNP gives information of decision. In this we are taking MNP range from minimum 0 to maximum 1. The whole range is distributed in five levels very\_low, low, medium, high, very\_high. The membership function for output parameter of MNP is shown in fig.4.



**Fig:3. Membership function of customer care services**

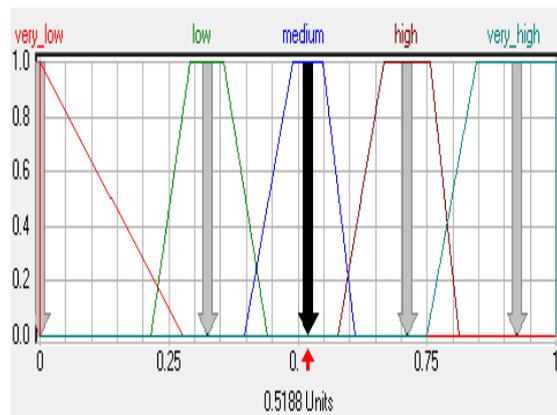


Fig:4. Membership function of MNP

Now we are correlating input parameters with output parameter by using If-Then rule. In the Rule Block [Fig.5.] twentyseven rules are defined.

IF			THEN
Networkcoverage	Tariff	customercare	mnp
POOR	CHEAP	UNSATISFACTORY	medium
POOR	CHEAP	MODERATE	medium
POOR	CHEAP	SATISFIED	medium
POOR	AFFORDABLE	UNSATISFACTORY	high
POOR	AFFORDABLE	MODERATE	high
POOR	AFFORDABLE	SATISFIED	medium
POOR	EXPENSIVE	UNSATISFACTORY	very_high
POOR	EXPENSIVE	MODERATE	very_high
POOR	EXPENSIVE	SATISFIED	high
AVERAGE	CHEAP	UNSATISFACTORY	medium
AVERAGE	CHEAP	MODERATE	low
AVERAGE	CHEAP	SATISFIED	low
AVERAGE	AFFORDABLE	UNSATISFACTORY	medium
AVERAGE	AFFORDABLE	MODERATE	medium
AVERAGE	AFFORDABLE	SATISFIED	medium
AVERAGE	EXPENSIVE	UNSATISFACTORY	high
AVERAGE	EXPENSIVE	MODERATE	high
AVERAGE	EXPENSIVE	SATISFIED	medium
STRONG	CHEAP	UNSATISFACTORY	low
STRONG	CHEAP	MODERATE	very_low
STRONG	CHEAP	SATISFIED	very_low
STRONG	AFFORDABLE	UNSATISFACTORY	medium
STRONG	AFFORDABLE	MODERATE	low
STRONG	AFFORDABLE	SATISFIED	low
STRONG	EXPENSIVE	UNSATISFACTORY	medium
STRONG	EXPENSIVE	MODERATE	medium
STRONG	EXPENSIVE	SATISFIED	medium

Fig:5. Rule block

#### IV. Results And Conclusion

We have used software fuzzyTECH Version 5.7.1.7 launched by company INFORM GmbH. A sample is taken when customer care services satisfaction is 55 %, network coverage of signal strength -75 db and tariff plan is 65 paisa per call then MNP will be 0.5188[Fig.6.]

The 3D graph showing both input parameters and output parameter is shown in Fig.7,8,9.

In this paper we have considered three input parameters and got the graphs showing the required probability of MNP. By using 3D graph we can find out MNP for various input values.

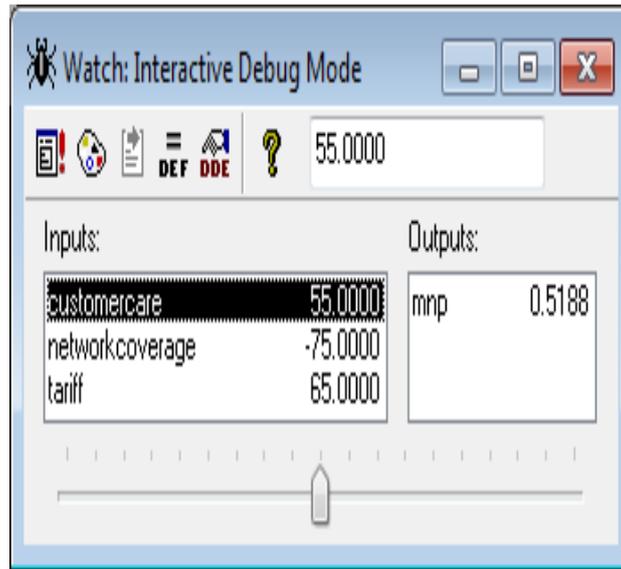


Fig:6. Interactive debug mode

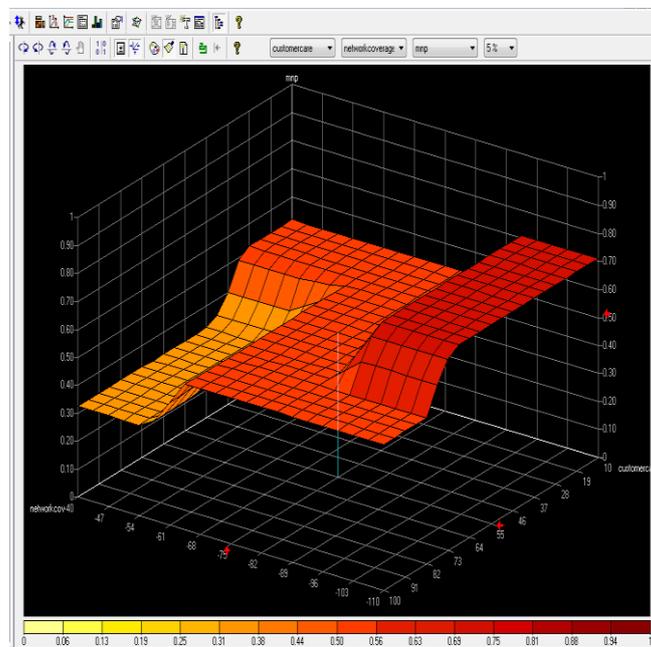


Fig:7. Graph between customer care, network coverage & MNP

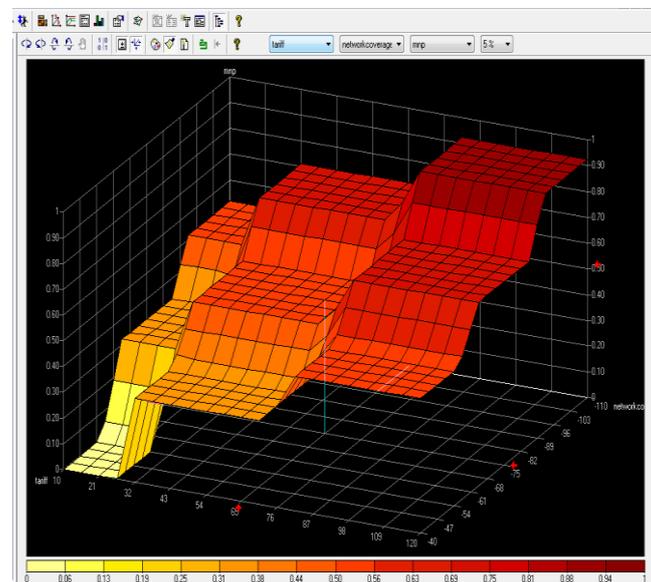


Fig:8. Graph between tariff, network coverage and MNP

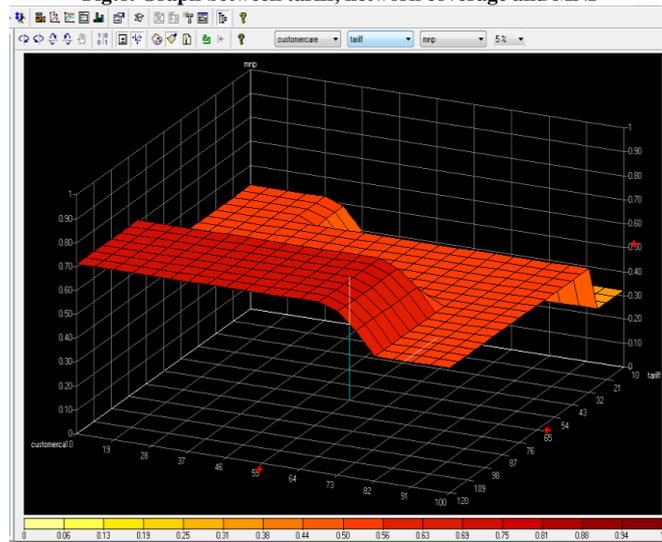


Fig:9. Graph between customer care, tariff and MNP

### V.FUTURE SCOPE

Here we have develop a Fuzzy Logic based system which tells us, whether MNP is to be done or not. In the designing of this system we had considered three parameters for the decision of MNP. As one of the development trends of the international Telecommunication industry, number portability has been introduced in many countries around the world and has played an important role in stimulating the competition and development of telecommunication market. All these measures will help to form a healthy competition structure of the telecommunication market in our country. This system can be further improved by considering many more parameters which are responsible for MNP. These parameters are signal strength, billing, IDD services etc.

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