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Overview of Prepaid and Postpaid Mobile Services

Jayshri Shelke
(Dept of Electronics and Telecommunication, PJLCE, Nagpur/RTMNU, India)

Abstract :- Nowadays the mobile environment expands significantly in communication field. Prepaid mobile services for 3G network enables telecommunication to sign up new users by utilizing the latest in converged billing technologies. The worldwide mobile communication market is expanding and subscribers are using prepaid or postpaid mobile services. Prepaid services are driving mobile communication into emerging markets all over the world. Prepaid phone service requires a user to make payment before calling where as postpaid service requires a user to make payment after calling. It is quite common to get prepaid SIM cards on every major Network. This paper discuss about Overview of prepaid mobile, postpaid mobile, various prepaid techniques, challenges and comparative analysis in prepaid mobile.
Keywords: - *BSS, Cellular Systems, GSM, 3G, MSC, PBP, SIM, SMS, SCP.*

I. INTRODUCTION

Cellular telephones are increasingly become a crucial part of our daily lives. As of Year 2012, the total number of cellular phone users worldwide was 6.7 billion and this was growing at the rate of 52.49% every 12 months. In the India, the industry is signing up new subscribers at the rate of one every two seconds, putting it on track to reach 851.70 million customers sometime later this year. According to the cellular Telecommunication Industry Association (CTIA) [1], the cellular industry in the United States grew 25.3 percent in 2010, adding 93 million additional wireless subscribers, for a total of 302.1 million customers. Average usage grew 40.5 percent in 2010 to 180 minutes a month compared to 130 minutes a year ago. In countries where mobile adoption is already high, prepaid options allow credit challenged and lower-income consumers to participate

The history of the prepaid mobile phone began in the 1990s when mobile phone operators sought to expand their market reach. Up until this point, mobile phone services were exclusively offered on a postpaid basis (contract-based), which excluded individuals with poor credit ratings and minors under the age of 18. Nowadays the prepaid mobile phone is found across the world.

II. OVERVIEW

A. Prepaid and Postpaid services in the world

Prepaid customers have traditionally been viewed as a secondary customer group; whereas postpaid customers are primary one. They have been seen as low average revenue per user (ARPU). In addition prepaid customer group includes one very important customer segment, which is teenagers and other young people. Although this group is not very credit worthy. Because operators have viewed prepaid customers as less desirable than postpaid, prepaid markets have remained untapped until the saturation point of postpaid customers has been seen in the near future. In the Western Europe the rapid growth of prepaid customers started approximately around year 1998[2]. Today over 60% of subscribers are using prepaid charging. Prepaid and post tariffs differ significantly. Postpaid tariff plans are usually very complex with many changing factors such as monthly charge, charge per minute depending on time of day, rental of mobile device etc. Prepaid tariffs are usually a bit simpler. Often prepaid tariff consist only the charge per minute. Of course these tariffs are extremely operator dependent in other words prepaid tariff plan is simpler than postpaid.

B. Features of Prepaid service

- Operator gets the money before the call is made
- Operator saves in billing expenses.
- No credit risk.
- It is a flexible service for teenagers.
- You can cancel or discontinue the service whenever you want.

C. Prepaid in GSM

- The emergence of prepaid in GSM networks can be seen as normal evolutionary market development. First operators wanted Operator gets the money before the call is made and it can invest it or at least earn interest on it.
- Operator saves in billing expenses.
- There is no credit risk. Some customers prefer to operate only on cash basis. Without prepaid this segment would be unreachable for operators.
- In some cultures cash transactions are preferred over credit transactions
- Some customers will never use their whole balance
- Customers who want to enjoy anonymity can also use mobile phones
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- To satisfy the needs of the most profitable market segment and after the growth in that segment begin to decrease the operators want to move to other segments. There are four alternative solutions for implementing prepaid service in GSM. These are:
  Intelligent Network(IN)
- Service node
- Hot billing
- Handset based approach [3]

1) Prepaid in IN

Figure 1 illustrates how intelligent network based prepaid solution is implemented in GSM networks. This and all the other illustration about technical implementation are presented. But the true complexity of these technologies lies beyond the scope of this presentation.

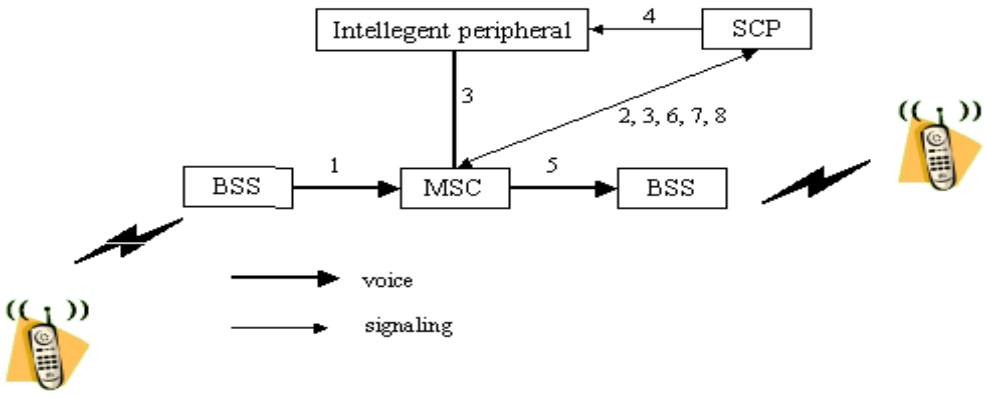

Figure 1: Prepaid in IN

1. Customer initiates a call
2. Mobile switching center (MSC) gets IN call setup trigger. It suspends the call and sends a message to service control point (SCP) that handles the prepaid account.
3. SCP instructs MSC to set up a voice link to intelligent peripheral. This link is used for notifications about the status of prepaid account.
4. SCP gives instructions to intelligent peripheral about account notifications.
5. SCP starts countdown timer and instructs MSC to connect the call.
6. Call terminates because countdown timer has expired or the call is completed or.
7. MSC gets IN call release trigger, sends disconnect message to SCP
8. SCP computes the cost of the call charges the prepaid account and sends current balance and cost of the call to MSC.

2) Prepaid by using service node technique

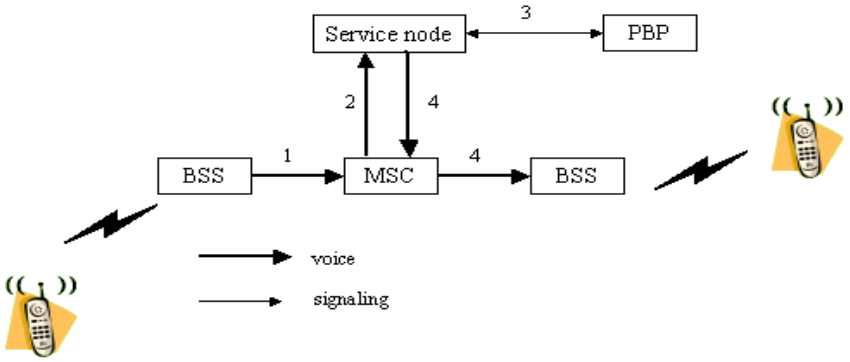

Figure 2: Service node prepaid

Figure 2 illustrates the implementation of service node prepaid technique in GSM networks.
1. Customer initiates a call
2. MSC detects that the caller uses prepaid account and sets up a voice channel to service node.
3. Service node asks from the prepaid billing platform (PBP) if the call should be allowed.
4. If call is allowed, a second voice channel is established from service node through MSC to the called party this method costs one extra voice channel compared to IN prepaid. On the other hand it is easy to implement of prepaid in GSM networks.

3) Prepaid using Hot Billing

Figure 3 illustrates the hot billing implementation of prepaid in GSM.

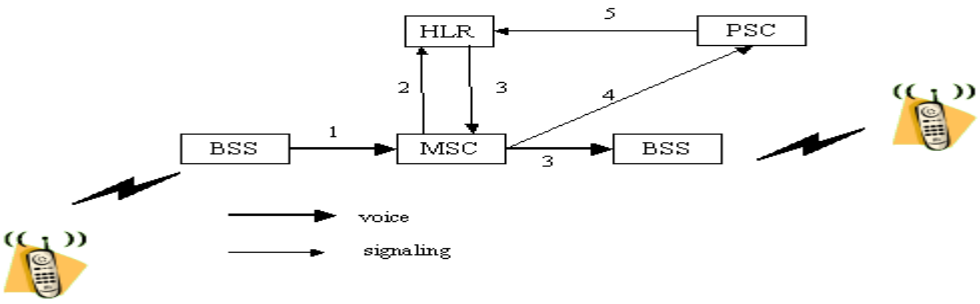

Figure 3: Prepaid using hot billing

1. Customer initiates a call and sends its international mobile subscriber identity (IMSI).
2. MSC asks from HLR if the service request is valid. Using IMSI HLR checks from authentication center the validity of the call.
3. HLR sends customer data to MSC and MSC connects the call.
4. When the call terminates call detail records sent to prepaid service center (PSC)
5. PSC charges the account. If the account is empty PSC notifies it to HLR and service is suspended. In this technique the billing is not real time and the operator is exposed to credit risk of one call.

4) Hand Set based Prepaid

Figure 4 illustrates the handset-based implementation of prepaid.

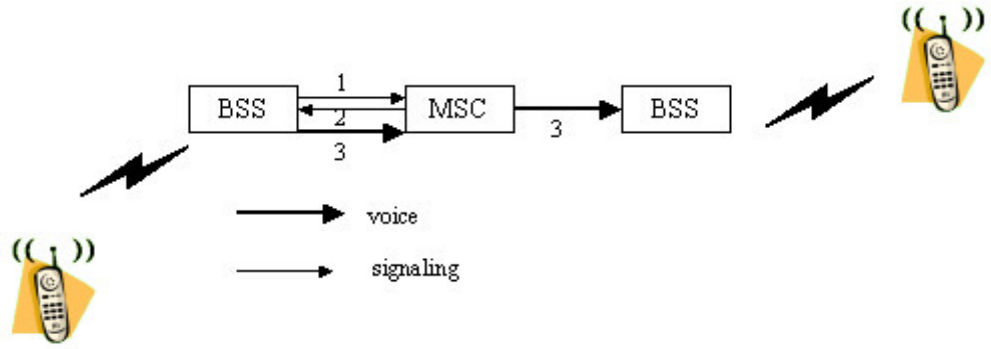

Figure 4: Prepaid using hand set

1. Customer initiates the call
2. MSC sends the pricing parameter to mobile station. Mobile station uses these parameters for decrementing the account
3. MS acknowledge the parameters and the call is connected
4. During the call MS decrements the prepaid account which is stored locally in the SIM card.

D. TOP Up System in Prepaid service

Top up systems are used to update the prepaid balance. Traditional ways of top up are vouchers and rechargeable phone card. The problem with these methods is that user has to go to some store in order to buy more talking time. One more resent way to update the balance is by using cash machine [4], but this really does not solve the problem of physically going somewhere to update the balance. A more customer friendly and quite resent solution is to allow the customer to allocate one of her debit/credit cards for updating the balance [4]. This ways the customer just calls to operators call center whenever she wants to update the balance.

E. Features of Postpaid services

- Operator gets the money after the call is made.
- It provides the detailed bill after a month.
- Credit check will be performed by the service provider.
- No limit in accessing the services provided.
- You cannot cancel or discontinue the service whenever you want.
- International calling and international roaming are not pre-activated in postpaid.
- It is not a flexible service for teenagers.[5]

F. Prepaid in GPRS networks

Mobile Internet means Internet services provided via GPRS networks. Technical problem are more or less similar to problems that where experienced when prepaid was implemented in GSM networks. Solving these problems require acquisition of equipment that can handle real time billing and top upping of the prepaid account [6]

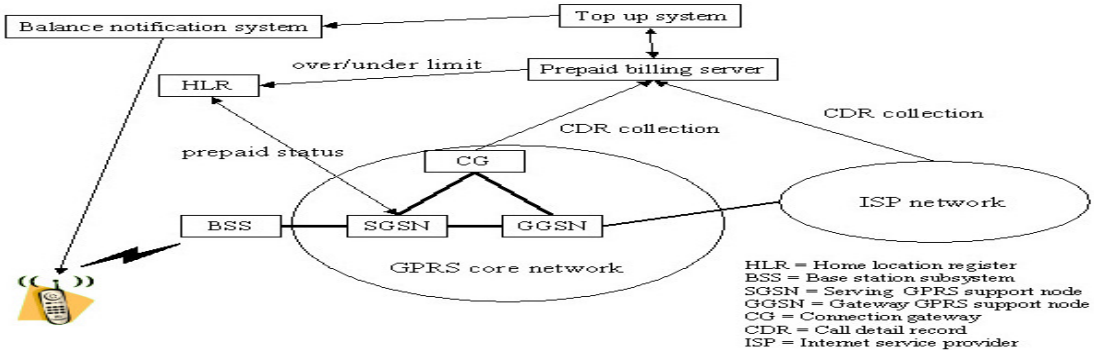

Figure 5: GPRS Network

III. COMPARISON BETWEEN PREPAID AND POSTPAID MOBILE SERVICES

Characteristics	Prepaid Services	Postpaid Services
Service Payments	In pre-paid you pay for the service before using it.	In post-paid you pay for the service after using it.
Accessing Limit	There is limit in accessing the services subscribed	There is no limit in accessing the services subscribed
Cancellation of service	In Prepaid, you can cancel or discontinue the service whenever you want.	In Postpaid, you can not cancel or discontinue the service whenever you want.
Credit check	In pre paid system, no credit check will be performed by the service provider.	In post paid system, credit check will be performed by the service provider. Some providers verify service address and billing address as well.
Billing	Prepaid service providers do not give any detailed bill.	Generally for postpaid services providers give detailed bill.
Life	In prepaid if you are travelling and could not find comfortable environment to recharge the service will be deactivated	In postpaid no need to worry until end of month or for certain period.
International calling and roaming	Generally international calling and international roaming are pre-activated in prepaid	Generally international calling and international roaming are not pre-activated in postpaid .you need to activate it.
Flexibility	Prepaid is good for teenagers and students as it is more flexible than Postpaid in managing monthly payments.	It is not good for teenagers and students as it is not flexible for managing monthly payments

IV. SECURITY ISSUES

- It is difficult to get information about customers.
- Customer loyalty is hard to maintain. Churn is higher with prepaid customers.
- Criminals prefer prepaid because of the anonymity.
- Real time charging systems are needed. Operator needs a separate top up system.

V. CONCLUSION

This study explains the different technique of the charging a mobile phone credits. It gives the different schemes of prepaid mobile services. The existing system does not provide adequate security and flexibility so there is a need to develop new mechanism. It point out that anonymous SIM cards users were posing a server threat to the security of the nation and the society as well. It introduces a new technique to be reiterated to stop illegal SIM users. To implements this telecommunication companies should make the necessary changes in their system to support the regulation.

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