**Phone Bill Calculation**

Phone bill calculation service is a mobile phone charge calculation system used in China Unicom. The purpose of phone bill calculation service is to determine a user’s phone charge within a month in terms of various kinds of aspects such as communication time, data usage, mobile phone tariffs. A user can calculate phone charge through the system.

1. **Types of Mobile Phone Tariffs**

There are two types of mobile phone tariffs, plan A and plan B. Each plan has four different choices, which contains different plan fee, communication time limit, data usage limit, call cost per minute and data cost per minute. Details are shown in the following Table 1.

Table 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| planType | planFee | talkTimeBench | flowBench | talkTimePer | flowPer |
| A | 46 | 50 | 150 | 0.25 | 0.3 |
| 96 | 96 | 240 | 0.15 | 0.3 |
| 286 | 286 | 900 | 0.15 | 0.3 |
| 886 | 3000 | 3000 | 0.15 | 0.3 |
| B | 46 | 120 | 40 | 0.25 | 0.3 |
| 96 | 450 | 80 | 0.15 | 0.3 |
| 126 | 680 | 100 | 0.15 | 0.3 |
| 186 | 1180 | 150 | 0.15 | 0.3 |

Plan fee is denoted by “planFee”.

Communication time limit is denoted by “talkTimeBench”.

Data usage limit is denoted by” flowBench”.

Call cost per minute is denoted by “talkTime per”.

Data cost per minute is denoted by “flowPer”.

1. **Calculation of phone charge**

Phone charge is billed according to extra call charge, extra data charge and plan fee.

bill = extraCallBill + extraDataBill + planFee

Phone charge is denoted by “bill”.

Extra call charge is denoted by “callBill”.

Extra data charge is denoted by “dataBill”.

1. **Calculation of extra call charge**

As we can see in Table 1, every choice of a plan has a communication time limit (talkTimeBench). If user’s actual communication time is no more than the communication time limit, he/she does not need to pay extra call charge. However, if user’s actual communication time is more than the communication time limit, he/she needs to pay extra call charge according to the following Table 2.

Table 2

|  |  |
| --- | --- |
| Extra call charge | Condition |
| (talkTime – talkTimeBench)\*talkTimePer | talkTime > talkTimeBench |

User’s actual communication time is denoted by “talkTime”.

1. **Calculation of extra data charge**

Calculation of extra data charge is very similar to the calculation of extra call charge .As we can see in Table 1, every choice of a plan has a data usage limit (flowBench). If user’s actual data usage is no more than the data usage limit, he/she does not need to pay extra data charge. If user’s actual data usage is more than the data usage limit, he/she needs to pay extra data charge according to the following Table 3.

Table 3

|  |  |
| --- | --- |
| Extra call charge | Condition |
| (flow - flowBench)\*flowPer | flow > flowBench |

User’s actual data usage is denoted by “flow”.

1. **Input Parameter**s

There are four input parameters related to phone bill calculation service:

|  |  |
| --- | --- |
| parameters | meaning |
| planType | type of plan |
| planFee | fee of a plan’s choice |
| talkTime | user’s actual communication time |
| flow | user’s actual data usage |

1. **System Output**

There is only one output parameter related to phone bill calculation service: bill, which means user’s phone charge.

1. **A Complete Example**

Suppose there is a user, whose name is Mike. He used phone bill calculation service to calculate the phone charge of last month and entered the following information.

planType: A

planFee: 46

talkTime: 100

flow: 100

Since Mike’s phone tariff is plan A with a fee of 46, we should use data associated with this choice to calculate Mike’s phone charge. As Mike’s actual communication time is more than communication time limit (50), he has to pay extra call charge. According to the formula in Table 2, the amount is (100-50)\*0.25 = 12.5. Because Mike’s actual data usage is less than data usage limit (150), he has no need to pay extra data charge. In summary, Mike’s phone charge of last month is calculated as follows:

bill = 12.5 + 0 + 46 = 58.5