

QoS Based Negotiation In Cellular Networks

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Abstract – In today's world due to increasing cellular network customers, Quality of Service (QoS) has decreased day by day. This problem may have occurred due to unavailability of network at certain places, network congestion etc. To solve this problem, I propose the concept of negotiation between Next Generation Network (NGN) Service Providers (SP) to find the best Service Provider for the customer. This will help the customer to get the desired QoS irrespective of who is providing the service. Whenever the current SP fails to provide the agreed upon QoS, the customer can switch to another SP.

Keywords – Cellular Network, NGN, QoS, Service Provider, Negotiation.

I. INTRODUCTION

Due to rapid increase in the number of Cellular network customers, the customers are not getting the Quality of Service (QoS) as promised by their service providers (SP) in the Service Level Agreement (SLA). Cellular network users experience difficulties like call blocking, lower bandwidth etc. because of network congestion or unavailability of network. Guaranteeing user QoS through service provider cooperation and negotiation is possible through Next Generation Network (NGN) framework. This work proposes a process flow in a TAM framework to carry out a negotiation between the Service Providers (SP) to get the best Service Provider for a particular customer. Whenever the QoS for a particular customer using NGN services drops below the promised value, the current SP comes up with a negotiation request. The new SP is selected after a negotiation between the “eligible” service providers. An SP is said to be “eligible” if it can provide the desired QoS to the customer via its own set of Network Provider Negotiation Agents. For negotiation there are various models viz. first price sealed bid, Vickrey with utility, Vickrey with QoS, Dutch, etc.

II. OPERATING SYSTEMS AND SOFTWARE (OSS) & TELECOMMUNICATION APPLICATION MAP (TAM)

OSS [1] can be defined as the software responsible for supporting, administrating and managing services provided by the SP. It offers functionalities like service activation/deactivation, tracking usage, designing, and network planning and inventory management. OSS is mainly used for automating management of existing services as well as introducing new services in the market quickly. The goal of New Generation Operations Software and Systems (NGOSS) is to achieve rapid development and integration of flexible, low cost OSS solutions based on out of the box components to meet the business needs

of today's service provider. TAM[2] provides a frame of reference for telecom applications. It provides the bridge between NGOSS frame work building blocks and real, deployable, potentially procurable applications by combining process functions and information data into recognized OSS applications or services.

II. ARCHITECTURE OF NGN

NGN[3] is a packet-based network for providing Telecommunication Services to users and to make use of QoS-enabled transport technologies in which service-related functions are independent of the underlying transport-related technologies.

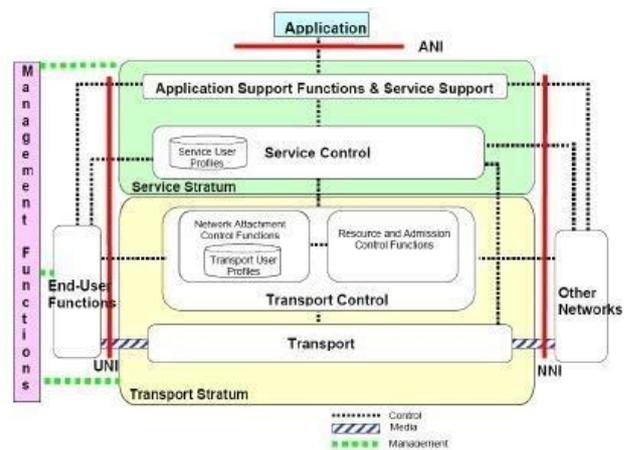


Fig.1. NGN Architecture

Characteristics of NGN architecture:

- General framework with general architectural principles
- End-to-end QoS
- Security
- Network management

II. NEGOTIATION IN NGN

Current mobile networks allow customer to access services offered by only one SP on one terminal. This SP in turn purchases network capacity from one Network Provider (NP). But today's customer is concerned about getting good quality service irrespective of who is providing it to him, e.g., customer can select a different SP on a call-by-call basis, customer can access 3G services provided by any SP just as the internet user is free to register with more than one Internet Service Provider (ISP). Thus, single SP per customer trend is declining. In cellular domain the process of negotiation can be used to switch from one SP to other. Following flow chart in Fig.2 shows the general negotiation flow.

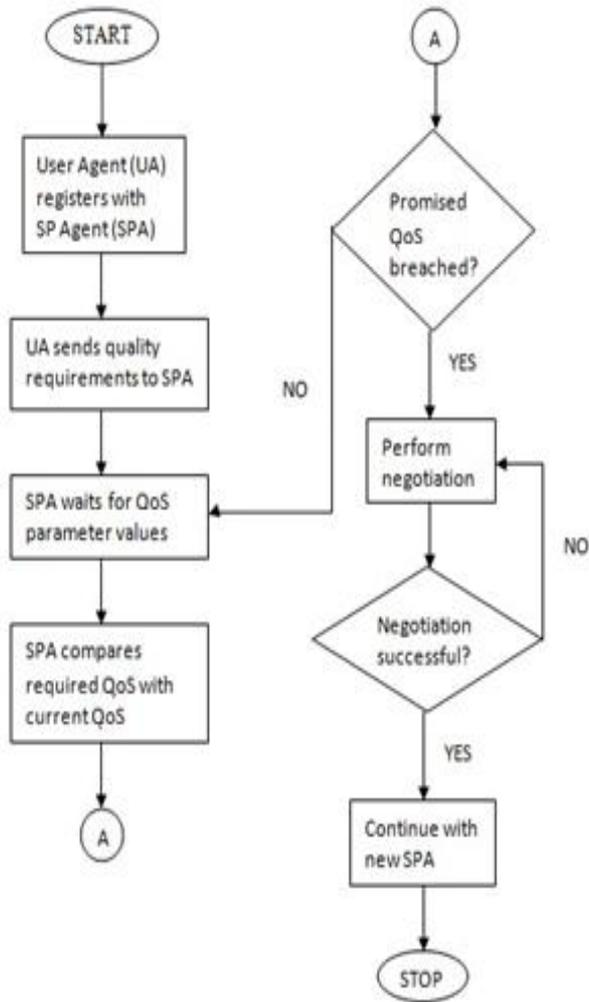


Fig.2. General Negotiation flow

Negotiation Models[4]:

A. First Price Sealed Bid (FPSB)

It is a form of auction where bidders submit one bid in a concealed fashion. Submitted bids are then compared and person with the highest bid wins the award, and pays the amount of his bid to the seller.

B. Dutch Model

In a Dutch auction, the item being sold is initially offered at a very high price, which is very higher than the amount the seller expects to receive. Bids are not sealed, as they are in some types of auctions. The price is decreased in decrements until a bidder accepts the current price. That bidder wins the auction and pays that price for the item.

C. Vickrey Model

Vickrey is a second price sealed-bid auction in which each participant simultaneously submits his or her bid. This is the same concept like in any other standard sealed-bid auction. Vickrey auction is a "second price" auction, which means the price paid for the exchanged item is equal to the second-highest bid placed.

III. PROPOSED SYSTEM DESIGN

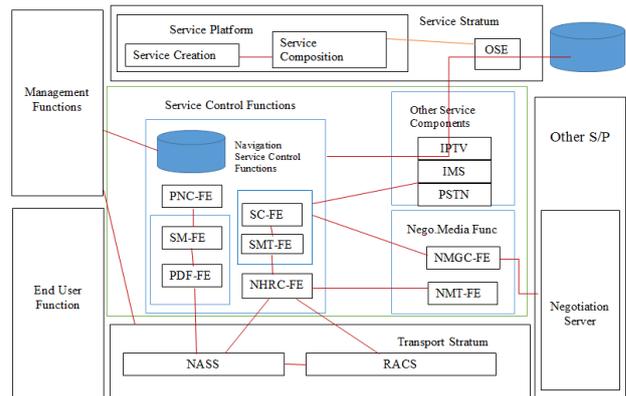


Fig.3. Negotiation component in NGN architecture

PNC-FE: PROXY NEGOTIATION CONTROL FUNCTIONAL ENTITY

SM: SESSION MANAGEMENT

PEC: POLICY ENFORCEMENT CONTROL

SC: SERVICE CATEGORIZATION

SMT: SIGNAL MAPPING AND TRANSLATION

NMRC: NEGOTIATION MEDIA RESOURCE CONTROL

NHGC: NEGOTIATION HOST GATEWAY CONTROL

NMT: NEGOTIATION MEDIA TRANSFER

PDF: POLICY DESCRIPTION FUNCTION

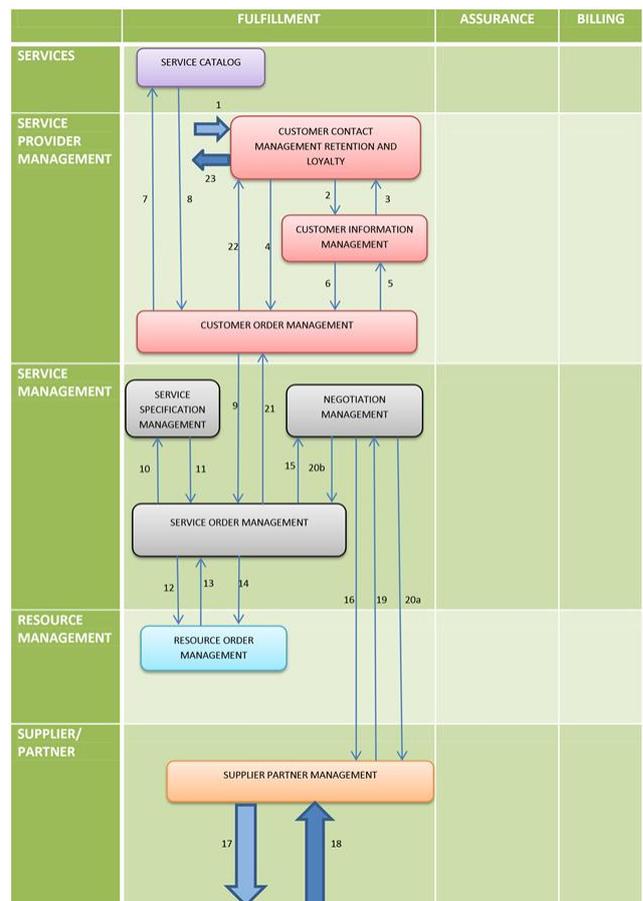


Fig.4. Level 2 TAM flow

1. Incoming customer request.
2. Request for authentication of the customer
3. Authentication result
4. Forwarding customer request
5. Request for Retrieval of customer information
6. Personalized customer information for order establishment
7. Request to check if particular customer can avail a particular service
8. Result of the previous request
9. Service order forwarding
10. Request for availability and validation of requested service
11. Validation and availability check result
12. Resource order request
13. Resource availability check result
14. Request for resource activation
15. Service activation request
16. Request for supplier quotation
17. Supplier quotation request
18. Supplier quotation
19. Forwarded supplier quotation
- 20a. Auction result
- 20b. Negotiation result report
21. Service order completion status
22. Customer order completion status
23. Report on requested service

I thus, suggest use of negotiation component in the NGN framework. With this approach all parties will get maximum Returns on Investment (ROI) because all parties are interested in making the best use of scarce resources. Customers will be benefitted because they wish to maximize access to resources when they require them; the Network Providers and Service Providers strive to provide such availability to achieve customer satisfaction. With Customers getting consistent QoS, they will wish to stay loyal to their Service Providers, which in turn will benefit the SP.

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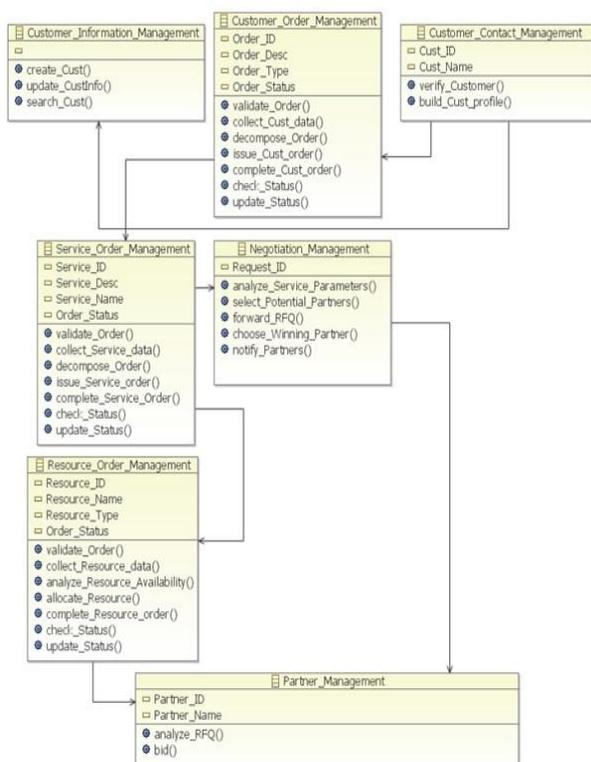


Fig.5. [5] Ecore diagram of the proposed system

IV. CONCLUSION

In this paper, I described difficulties faced by cellular network users and possible reasons behind these problems.