Requirements Engineering in Telecom

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Abstract— **this document provides study of Requirement Engineering use in Telecom Industry based on writers experience working with Ericsson Inc.**
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I. INTRODUCTION

This document discusses the importance of applying Requirements Engineering in Telecom industry. The methodology used is by doing field study and interaction with stakeholders.

Telecom industry has mass market customer environment which demands 99.999% availability. Telecom services also used by mission critical public services: emergency call and amber alert for example.

By this nature, telecom industry is heavily government regulated. US currently have 7 major telecom operators operating countrywide. Figure below shows US telecommunication market share in 2010 (source: Wikipedia).
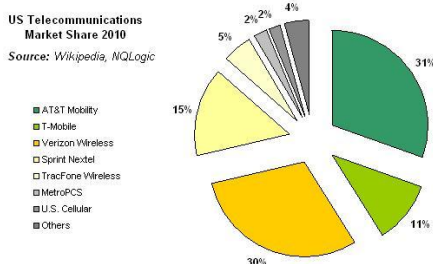

Fig. 1 US Telecommunication Market Share 2010

As an international standard body, 3GPP (3rd Generation Partnership Project) defines telecom system standardization to make sure interoperability between vendors. Figure below depicts standard architecture defined by 3GPP for 2G/3G and 4G network.
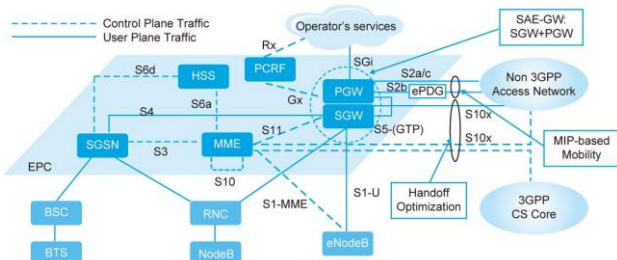

Fig. 2 3GPP Network Architecture Reference

II. CASE STUDY

The case study will focus on the gateway expansion of the network (PGW/SGW in the Fig 2 reference network). The requirements gathered for the project are:

- R1: Expansion of Gateway Capacity
- R2: Additional Node
- R3: Integrate with Existing Network

The requirements above gathered by direct interaction with the network owner/architect that works for the network operator.

III. STAKE HOLDERS

There are several stake holders involved in the case study project. All the stake holders are considered in making decision and design during the case study as follow:

A. Mobile Network Operator (MNO)

This stake holder owns the network and operates it based on approval from the government. In this study case, the MNO comes with 3 requirements (R1, R2 and R3) as explained before.

B. Subscriber

The subscriber of the MNO will indirectly impact the project study case. Increasing traffic from the subscriber drives MNO to start initiating the project.

C. Standard Body

Standard body defines the call flow and the network architecture that must be fulfilled in order for the MNO to successfully provide services to the subscribers. In this case 3GPP will be the standard body references.

D. Network Equipment Vendor

Network equipment vendors provide the MNO the product that helps MNO to deliver services to the subscribers. In this study case, the vendor provides the gateway as stated by R1.

IV. REQUIREMENTS AND VALIDATION

This chapter provides the requirements gathering and validation of the requirement process and work flow. The process must be followed in order to make sure that all the requirements gathered and translated correctly into the system design and implementation.

The process start with the project start indication that provided by the MNO to the Network Equipment vendor by

releasing a Purchase Order (PO). The next step is for the network architects from both the MNO and the vendor to work together to gather all the needed requirements information. After the requirements information gathered and documented, both parties have to sign off as the project will proceed into the next step.

Validation testing inside controlled environment (lab) will be conducted to ensure that agreed requirements are fulfilled by the system provided.

After the validation testing in the lab finished and passes all the testing, the next step is to deploy the system into the production network environment that serves the subscribers. The project considered closed after production network validation testing passed.

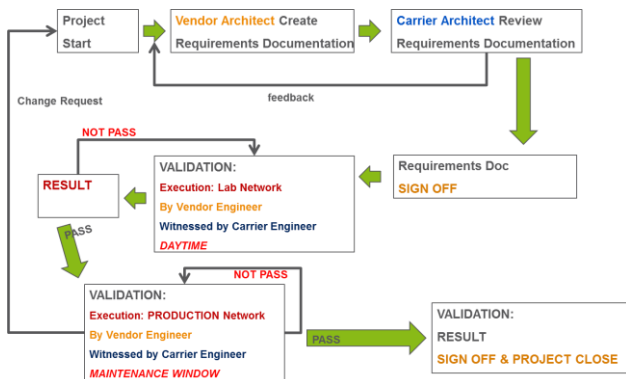Figure 3 below explains above process.

Fig. 3 Requirements and Validation Workflow

V. SYSTEM DESIGN

Based on the requirements, the system will be designed as cluster of processors that ensure high availability and the 99.999% service time.

Figure below displays how the system will be designed.

Fig. 4 System Design

The system design above contains 2 switches, 10 main processors and 1 backup processor. Later on in the validation phase of the project, both parties will test the functionality of each processor and the handover mechanism in case of one processor fails.

VI. CONCLUSIONS

The Requirements Engineering approach should always be used in the telecom industry due to its nature of delivering mission critical mass market services.

It is also important for all the parties to understand the Requirements Engineering approach in requirement gathering, system design, system validation and system evolution.

The following points will also be a major factor to consider Requirements Engineering approach in the telecommunication industry.

- Telco Network serves Mass Market
    i.   Failure in testing means bad quality of service
    ii. Bad quality of service means losing revenue
- 5 Nines Availability: 99.999% is a must
    i.   Redundancy must be tested and passed
    ii. High availability must be tested and passed
- Mission Critical (emergency call, etc)
    i.   Requirements Engineering must be applied to make sure customer requirements obtained
    ii. Requirements Engineering needed to minimize failure in design and execution
- Strictly Gov Regulated: Interruption cause fines
    i.   All testing done twice: lab and production

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