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Designing a Billing system module for Wi-Max Telecommunication Companies

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Authorization

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ABSTRACT

The WI-MAX is one of the new technologies in the telecommunication industry, as any telecommunication division a billing system must be implemented and suited to match the new technology requirements, there is a saying in the telecommunication society you can't sell what you can't Bill.

Implementing and designing a billing system is not an easy job. You must fulfill two major parts, the management and business side and the technical and IT side, in this research we will focus on the business and management side by studying the business process and work flows of the billing system in the Wi-MAX operation.

The research will address the Wi-MAX requirements by interviewing experts and leaders in the WI-MAX field and the billing system is one of their main concerns.

The results concluded in the research will help the WI-MAX Have a better vision of the WI-MAX Billing, but the implementation depends on the BSS (Business Support System) and the OSS (Operation Support System) and some of the results may not be applicable for implementation because of a system limitation.

CHAPTER 1: GLOBAL FRAMEWORK OF THE RESEARCH

1.1.Introduction

This research will be focusing on billing system, and the main difference between the common and basic billing system usually used in the Internet Service Providers (ISP) and the WI-MAX telecommunication companies.

Analyzing the basic billing system from a management and business point view and describing the basic functionalities and flows in the system will give an overall look of the system.

In order to study the difference between the normal ISP's requirement and the WI-MAX requirement we must first understand the definitions and the basic functionalities of the billing system and the WI-MAX.

What is the billing system?

The ISP Billing system is a high-end solution, designed to facilitate the ISPs and other Internet based service companies, at the forefront of the Internet economy to profitably manage customer relationships, rapidly introduce new services, and collect revenues. It simplifies day to day operations, efficient client management, a whole package of useful managerial reports, seamless system administration and a lot more at a very suitable cost. Advanced ISP Billing system offers web-based interface for both customers and administration.

With Advanced ISP Billing system, one can experience role based security. Every billing administrator is assigned a role comprised of specific tasks. By role assignment, billing administrator is able to perform only those tasks which are related to him/her. Every administrator has his/her own username/password to access billing interface. Billing administrators can be restricted to specific IP address for accessing billing interface. This ensures information security and reliability at the highest levels.

ISP Billing is used for billing IP services delivered by Dial Up/DSL Service Providers, Broadband Service Providers Hot Spot Operators, Wireless Internet Service Providers and WiMax Service Providers.

Cultivated from the rigors of real world deployments, ISP Billing is built on an experienced foundation of deep technical and service administration knowledge providing global customers with the value of Subscriber Management, Individual and Corporate accounts, Prepaid and Postpaid billing, prepaid card's management , Hourly, monthly and bandwidth billing, Flexible Billing Tariff, Auto provisioning with different E-mail servers, Web based subscriber self-care, Multiple reseller/dealer, Online credit card transactions, Invoicing system , ISP billing in ASP model, Robust administrative and end-user security , Scalable application architecture

It is an effective and customizable billing solution for different types of Internet Service providers

So as we see the billing system is the sole of any communication company therefore the abilities and the flexibility of the system will grant the company a competitive advantage. And also it will organize and implement the business processes and the work flow in the company.

We will study and develop a billing system implementation (module) that wills to enforce improvement in the company performance and business process.

What is Wi-Max?

What is Wi-MAX or Worldwide Interoperability for Microwave Access? Wi-MAX is an Institute of Electrical and Electronics Engineers (IEEE, see <http://www.ieee.org>) standard designated 802.16-2004 (fixed wireless applications) and 802.16e-2005 (mobile wire-less).

Wi-MAX has the potential to replace a number of existing

telecommunications infrastructures. In a fixed wireless configuration it can replace the telephone company's copper wire networks, the cable TV's coaxial cable infrastructure while offering Internet Service Provider (ISP) services. In its mobile variant, Wi-MAX has the potential to replace cellular networks.

Fixed Wi-MAX

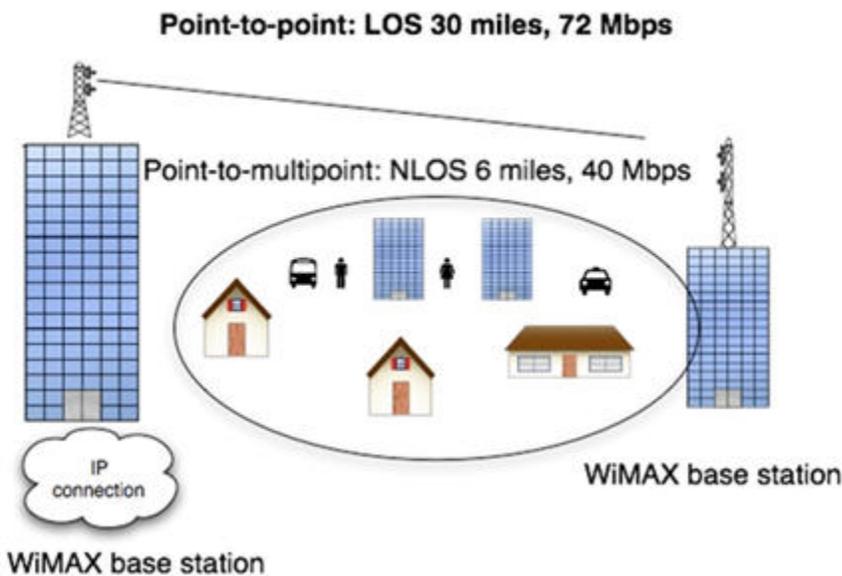


Figure 2.2 Fixed Wi-MAX offers cost effective point to point and point to multi-point solutions

What makes Wi-MAX so exciting is the broad range of applications it makes possible but not limited to broadband internet access, T1/E1 substitute for businesses, voice over Internet protocol (VoIP) as telephone company substitute, Internet Protocol Television (IPTV) as cable TV substitute, backhaul for Wi-Fi hotspots and cell phone towers, mobile telephone service, mobile data TV, mobile emergency response services, wireless backhaul as substitute for fiber optic cable.

Wi-MAX provides fixed, portable or mobile non-line-of sight service from a base station to a subscriber station, also known as customer premise equipment (CPE). Some goals for Wi-MAX include a radius of service coverage of 6 miles from a Wi-MAX base station for point-to-multipoint,

non-line-of-sight (see following pages for illustrations and definitions) service. This service should deliver approximately 40 megabits per second (Mbps) for fixed and portable access applications. That Wi-MAX cell site should offer enough bandwidth to support hundreds of businesses with T1 speeds and thousands of residential customers with the equivalent of DSL services from one base station.

Mobile Wi-MAX

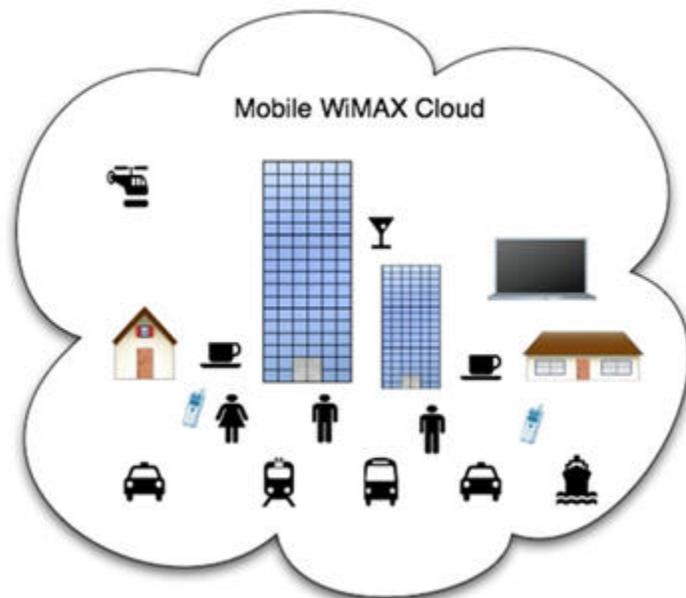


Figure 1.2 Mobile Wi-MAX allows any telecommunications to go mobile

Mobile Wi-MAX takes the fixed wireless application a step further and enables cell phone-like applications on a much larger scale. For example, mobile Wi-MAX enables streaming video to be broadcast from a speeding police or other emergency vehicle at over 70 MPH. It potentially replaces cell phones and mobile data offerings from cell phone operators. In addition to being the final leg in a quadruple play, it offers superior building penetration and improved security measures over fixed Wi-MAX. Mobile Wi-MAX will be very valuable for emerging services such as mobile TV and gaming.

Wi-MAX is not Wi-Fi

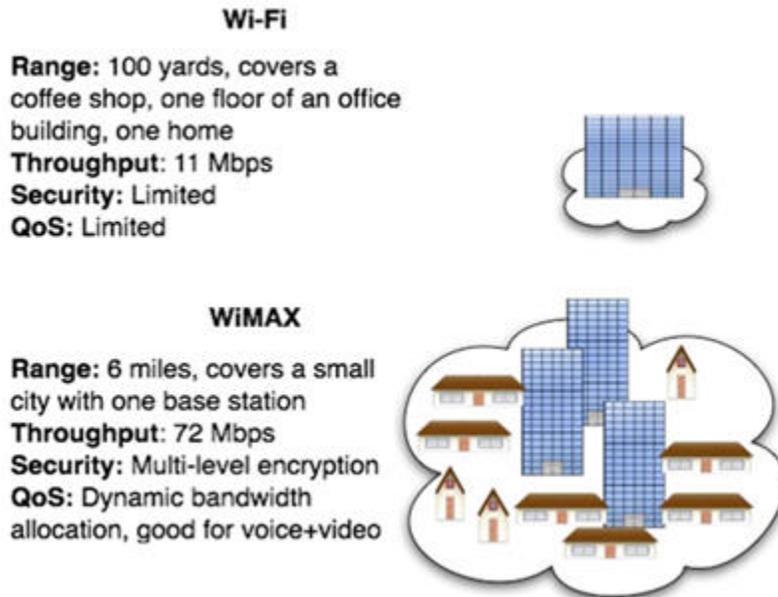


Figure 1.3 Where Wi-Fi covers an office or coffee shop, Wi-MAX covers a city

One of the most often heard descriptions of Wi-MAX in the press is that it is "Wi-Fi on steroids". In truth, it is considerably more than that. Not only does Wi-MAX offer exponentially greater range and throughput than Wi-Fi (technically speaking 802.11b, although new variants of 802.11 offer substantial improvements over the "b" variant of 802.11), it also offers carrier grade quality of service (QoS) and security. Wi-Fi has been notorious for its lack of security. The "b" variant of 802.11 offered no prioritization of traffic making it less than ideal for voice or video. The limited range and throughput of Wi-Fi means that a Wi-Fi service provider must deploy multiple access points in order to cover the same area and service the same number of customers as one Wi-MAX base station (note the differences in nomenclature). The IEEE 802.11 Working group has since approved upgrades for 802.11 security and QoS.

1.2. Problem Definition

Many companies will lose a significant amount of abilities and competitive advantages because of the rigidity of the billing system and the inconvenience of the business process.

In this Thesis we will study and develop a system (module) that will reflect on the performance of Wi-Max oriented telecommunication companies by improving the billing system, and how various abilities of the billing system can affect the performance of the company and how the development of the system will develop the company competitiveness in the market.

Therefore this research will examine the billing system and see what will be the changes that the market of the Wi-Max require to ably such system in its operations in order to meet the market demand.

1.3. Thesis questions

Q1: What is the importance of the billing system in a Wi-Max operation?

Q2: is there any deference between the data and Internet billing and the standard Wi-Max billing?

Q3: How to achieve excellence in a Wi-Max operation using the billing system?

Q4: How to overcome and rigidness in the billing system?

Q5: Can the billing system give and secure an advantage for the company position in the market?

Q6: Is there any relation between marketing and the billing system?

1.4. Thesis Hypotheses

First Hypotheses: there is no impotence of the billing system in a Wi-Max operation

Second Hypotheses: there is no deference between the Internet and data billing and the Wi-Max billing

Third Hypotheses: there is necessity of ongoing improvement to achieve excellence in the market

Fourth Hypotheses: it's not important to use the external application and workarounds to overcome the billing system rigidity.

Fifth Hypotheses: can the billing has no affect on the competitive advantage in for the company position in the a market

Sixth Hypotheses: there is no relation between marketing and the billing system.

1.5. Thesis significant

The significance of the study lies in the following:

By Building a system of business process and improving the workflow of the company departments and developing the workflow the company stakeholders and how can it be improved, and affecting the customers by using CRM a Self-care modules.

Looking into the difference between the basic data and internet billing and the Wi-max billing, this will be accomplished by taking the opinion of the leaders and key persons in leading Wi-Max companies and implementing their requirement in workflows.

In this research we will study the business side of the billing system and the work flows of the operation and designing the new requirements of the Wi-Max, any telecom company interested in launching a Wi-Max solution.

1.6.The study objectives

The main objective of this thesis is to analyze the basic billing system and the main functionalities that surround the billing system from a business prospective and explain how each process interact to complete the billing cycle.

Then we analyze the requirement for the Wi-Max operators and how the basic billing system may support their operation and if there is any extra requirement to help in their normal business cycle.

Building a solution (if possible) to match these requirement and highlighting the main factors and parts that this solution or process may affect.

1.7.Study Methodology and Procedures

Analysis

First: we will study the old and basic billing system used in regular ISP and data providers and determined the parts that should be improved as business point of view. These pointes will be determined by arranging interviews with some of the Wi-Max operator key persons.

Implementation

First: we will gather information about the requirements from each process separately.

Second: we will translate these requirements into a business flow

Third: we build a business process diagram and link the department's requirements together.

Forth: Implement these business process diagrams into the system if possible.

1.8. The study Delimitation

1. There is very few studies about this subject or if any studies are found they are considered to be confidential to the billing system companies
2. The results will be limited to the Wi-Max operators
3. The results can't be generalized
4. The parts that the system provider will allow us to change and develop
5. Arranging time and place to schedule an interview with some of the operator's key persons.
6. The duration of the study

Chapter 2: literature review

2.1. “Customer Knowledge Management “

In this paper, they are illustrating the use of modern information technology to provide knowledge support to CRM processes. This knowledge support allows for performance enhancement in customer oriented business processes. They are basing their reasoning on an integrated Customer Knowledge Management process model, which identifies six CRM sub-processes and four aspects of Knowledge Management. This integrated model aims at achieving knowledge transparency, knowledge dissemination, knowledge development and knowledge efficiency. The application of the four aspects content, competence, community and composition in specific CRM sub-processes will be demonstrated in several action research cases. These cases were implemented in European companies in the financial services sector and concern the support of customer-facing processes across all channels. They validate the proposed architecture while indicating critical success factors for a successful implementation of Customer Knowledge Management. [*²]

This study shows the importance of the CRM and how it can improve the performance of the company and it also shows the modules of the CRM and how to Deriving an Integrated Customer Knowledge Management Process Model to Integrating Customer Relationship Management and Knowledge Management, we are interested in this study because the CRM is a part of the billing system we are implementing in this thesis.

2.2. “ORGANIZATIONAL ASSESSMENT A Framework for Improving Performance”

The analysis of organizational performance is a crucial step in the organizational assessment process. Yet, measuring performance is one of the most problematic issues in the field of organizational theory (Steers, 1975; Zammuto, 1982; Handa and Adas, 1996). While there are a number of approaches to assessing organizational performance, there is little consensus as to what constitutes a valid set of criteria.

In the 1950s, performance was referred to as the extent to which an organization as a social system fulfilled its objectives (Georgopoulos and Tannenbaum, 1957). In the 1960s and 1970s, Yuchtman and Seashore (1967) defined performance as the ability of an organization to exploit its environment to access scarce resources. In the 1980s and 1990s, as constructivist thinking became more standard in organizational theory, it was recognized that identifying organizational goals is more complex than first thought. A measurement of organizational performance needs to involve the perceptions of the organization’s multiple constituencies or stakeholders, including those who work within the organization (Hassard and Parker, 1993).

In other words, the concept of organizational performance is, at least in part, individually constructed. The influence or power of different stakeholders determines which performance message is dominant.

Broadly speaking, the organizational development literature discusses performance at four levels:

- The individual employee (performance appraisal)
- The team or small group (team performance)
- The program (program performance)
- The organization (organizational performance).

This article shows the key performance factors which we are trying to improve by the billing system. [*6]

2.3. “Environmental Management Systems: Do They Improve Performance?”

The NDEMS database was designed as a longitudinal study of EMS implementation in real time, using site-specific facilities as the principal unit of analysis. For each facility, the research team administered a baseline protocol capturing three years’ retrospective data, in order to establish the environmental performance levels prior to EMS implementation. They then administered an EMS design protocol, which collected data on the EMS design process as well as its substantive content (for instance, each facility’s specific environmental aspects, impacts, determinations of significance, objectives and targets). Finally, they administered two update protocols at approximately one-year intervals, to identify hangs in environmental, economic and other outcomes after introduction of the EMS as well as refinements to the EMS itself. All data were subject to detailed quality-control procedures to ensure data quality and completeness, including reconfirmation of all data with the facilities themselves before final inclusion in the database. This study reports the consequences of EMS implementation by a sample of 83 facilities in 17 U.S. states. All 83 of these facilities provided baseline data, and 58 of them also provided detailed data on their EMS design processes and content. Thirty-seven also provided detailed initial update data on environmental, compliance, and economic performance during the year after introduction of their EMS – about 2½ years after the end of the baseline period, on average – and 22 provided second-update data approximately one year later. These facilities were drawn from 20 business sectors, and included both publicly traded, privately held, and government facilities such as military bases and wastewater treatment plants. They ranged from major manufacturers, electric utilities, and branch plants of large multinational corporations to small independent businesses such as electroplaters and auto parts suppliers.

This study suggests that the introduction of an EMS can be expected to be at least somewhat beneficial to the environmental performance of most facilities, as well as to their operating and management efficiencies, and in some cases to their regulatory compliance patterns so we can study these factors and try to implement them over. [*11]

2.4. “Introduction to telecom billing”

The book describes the basic billing system and gives summary about all activates and functionalities of the billing system in a very interesting way but it doesn't go in depth in theses functionalities

Here are some of the major billing functionalities that the book describes

- **The Rating Engine: Processing the Usage:** As part of the billing system, the Rating Engine receives call details from various sources (event records), reformats and edits these into UDRs, assigns a customer account to the UDR (guiding), calculates call charges for each UDR, and gets the UDR ready for Invoicing.
- **The Invoicing Engine: Month-End Processing:** The Invoicing Engine uses data from the updated bill pool and adds non-call related billing charges and financial adjustments. The billing system then adds fixed recurring charges (such as monthly service fees and taxes), applies payments that have been received, produces invoices, and maintains a history database.
- **Clearinghouse:** A clearinghouse is a company or association that transfers billing records and/or performs financial clearing functions between carriers that allow their customers to use each other's networks. The clearinghouse receives, validates and accounts for telephone bills for several telephone service providers. Clearinghouses are particularly important for international billing because they convert different data record formats that may be used by some service providers and convert for the currency exchange rate.
- **Invoices:** Invoices contain the details of how much the customer should pay to the carrier, when the amount is due and other information regarding the bill. Invoices usually provide a customer with detailed information regarding the source of the charge (date and location), reasons for the charge (service provided), and the amount of the charge.
- **Management Reporting:** Management reports provide information to finance, sales, and operations on the performance of the system. Reports can identify problems such as, silent churn, potential new services, and network congestion. Churn is the process of customers disconnecting from one telecommunications service provider. Churn can be a natural process of customer geographic relocation or to may be the result of customers selecting a new service provider in their local area. Silent churn is the process of customers disconnecting from one telecommunications service provider due to a competitor's influence. Silent churn is usually the result of inadequate customer service or lack of competitive rate plans. Customers that are transitioning to competitor's services will show rapid declines in usage of service. [*⁸]

Customer Relationship Management (CRM) : Customer Relationship Management (CRM), of which Customer Care may be a sub-system, is the process of communicating with the customer regarding their establishing accounts, service feature activation, handling customer inquiries adjusting accounts for disputes (account management), technical support, selling additional products and services to the customer (post sales support), and collection services

2.5. “Why Improving Performance Management Systems Is So Difficult”

One of the salient aspects of working with companies wishing to improve performance appraisal and management systems is the simple repetition of a phenomenon. Most companies redesign their performance management systems. Sometimes they attempt total redesigns. Sometimes it's tweaking it, changing the forms and so on. Perhaps the strangest thing is the common result most companies receive. They end up with something that might look a bit different, but actually ends up functioning exactly like the old system. This revamping process has to be one of the largest investments gone for naught, one can find in management arenas.

In this article, they explain why this occurs, and showing why most improvement efforts failed miserably which maybe very important for our study. [*¹]

2.6. “Raising the Bar on Performance Management”

Forward thinking companies are taking steps to successfully address this negative view of performance management. They are implementing innovative solutions that ensure processes deliver real results and improve performance. The purpose of this guide is to provide concrete guidelines and practical steps that can be used to improve the performance management processes at your organization. In addition, a new class of automated performance management solutions has emerged to specifically address small- and medium-sized businesses. We conclude this guide with a few tips for selecting an automated performance management system to implement best practices across your company.

This study shows 10 Ways to Optimize the Performance Review Process so that we can study and see what can be implemented in our case and how to implement it [*⁷]

2.7. Business Process Framework (eTOM)

What is eTOM ?

Enhanced Telecom Operator Map (eTOM) is a business process framework which describes and analyzes all enterprise processes at different levels of details according to the significance and priority. At the same time it is independent of Organization, Technology & Services

OR

The eTOM Business Process Framework serves as the blueprint for process direction and the starting point for development and integration of Business and Operations Support Systems (BSS and OSS respectively) and helps to drive TM Forum members work to develop NGOSS solutions.

Benefits of using the eTOM

- eTOM makes available a standard structure, terminology and classification scheme for describing business processes and their constituent building blocks
- eTOM supplies a foundation for applying enterprise-wide discipline to the development of business processes
- eTOM provides a basis for understanding and managing portfolios of IT applications in terms of business process requirements
- eTOM enables creation of consistent and high-quality end-to-end process flows, with opportunities for cost and performance improvement, and for re-use of existing processes and systems
- eTOM use across the industry will increase the likelihood that off-the-shelf applications will be readily integrated into the enterprise, at a lower cost than custom-built applications

Services provided by the adjacent layer below

1. *Network Elements*

Networking equipment; the single boxes, servers, etc. that constitute a single resource.

2. *Element Management*

The management functionality that is required to operate a single piece of equipment.

3. *Network Management*

When multiple network elements are interconnected they form a network.

An end-to-end connection or a telephone call uses a set of network resources.

Network Management refers to the functionality required to control the network.

4. *Service Management*

The network provides services.

Examples: A leased line subscription, an email account and a telephone subscription.

The Service management refers to the controlling of these services.

5. *Business Management*

The services are provided to subscribers (customers).

The customer management and related issues like billing is referred

To as Business Management

eTOM Operations - Vertical Process Groupings

Figure 2.1

- **Fulfillment:** this process is responsible for providing customers with their requested products in a timely and correct manner.
- **Assurance:** this process is responsible for the execution of proactive and reactive maintenance activities to ensure that services provided to customers are continuously available and to SLA or QoS performance levels.
- **Billing:** this process is responsible for the production of timely and accurate bills, for providing pre-bill use information and billing to customers, for processing their payments, and performing payment collections.
- **Operations Support & Readiness:** this process is responsible for support to the “FAB” processes, and for ensuring operational readiness in the fulfillment, assurance and billing areas.

Using eTOM: Examples

Major US Service Provider using eTOM to clarify process implications for new projects under assessment -cost reduction from \$4m to \$160K achieved

Major European Service Provider using eTOM as a “neutral” process framework to arbitrate process disputes between internal Business Units

Major Australian Service Provider using eTOM as an “industry-standard” process framework to evolve its own business, and also drive system solutions and vendors to meet its needs

Conclusion

- eTOM provides an industry-accepted Business Process Framework supporting:
 - ✓ a process-oriented business model for use by Service Providers, Vendors, Integrators, etc.
 - ✓ A common understanding of business processes and their linkages applicable across the industry
 - ✓ a basis for customizing and extending this common base to meet detailed, specific business needs
- eTOM includes definition and detail for:
 - ✓ process structure (hierarchy)
 - ✓ process decompositions (levels)
 - ✓ process flows (linkages)
 - ✓ process dynamics (behavior)
- eTOM is a major component in the NGOSS program aimed at fast, flexible integration of OSSs & BSSs
 - ✓ eTOM provides the map for the NGOSS Business View
 - ✓ NGOSS also addresses the rest in the development cycle

[*³]

Chapter 3: the Billing System and the basic functionality

Strategic Platform aims to provide a generic solution architecture to deliver world class telecom architecture and solution to suffice the business needs of telecom operators globally. NGOSS, eTOM Model from tmforum is taken as basis to define the architecture.

The purpose of the conceptual architecture is:

- To provide a comprehensive, concise and accurate view of the entire system without being overwhelmed by implementation detail.
- Define hub and spoke and architecture to remove dependency amongst systems.
- To partition the system into loosely coupled logical components which provide functionally grouped services.
- To define the responsibilities of each logical component and the interfaces (services) offered by each logical component to be implemented by the application.
- To provide solutions to telecom operators for faster time to market
- To define scalable and robust architecture with an uptime of 99.9 % and above
- To provide secure systems to a telecom operator

Architecture viewpoints

(Reference 2)

A number of architecture viewpoints are used to describe different aspects of the Strategic Platform. The Conceptual Architecture forms one of these viewpoints.

The architecture contains the following components:

- *Conceptual Architecture (Level 0)*

The Conceptual Architecture presents the highest level of abstraction. Conceptual provides a birds eye view of the systems. It depicts the logical IT architecture to be implemented for a telecom operator to carry out day to day operations, defines key process areas and depicts internal and external entities interact with the enterprise.

- *Component Architecture (Level 1)*

Level 1 explodes Level 0 systems and identifies important functional modules of each system and groups these systems logically. Level 1 processes decomposes end to end processes into

components that are required to support the customer and manage the business .Sections Figure 3.3 to **Error! Reference source not found.** in this document covers the component architecture.

The partitioning of the system into logical components is intended to define coherent grouping of services that can be realized by software products. Therefore these logical components will map easily onto application software components, but need not necessarily map one-to-one onto software packages or technology components.

- *Component Design (Level 2)*

The Component Design is a further drill down of Level 1 Architecture and provides detailed functionality of each sub-component as well as interface information for each sub-component. These are covered in Sections Figure 3.3 to **Error! Reference source not found.** in this document.

Conceptual Architecture

Conceptual view provides an overall context that differentiates strategy and life cycle processes from operational processes. The Conceptual Architecture is the Level 0 view of the architecture(level 0 eTOM Model). This level is concerned with the overall functions (IT and technology) that are needed to enable the success of a business. It is not concerned with specific platforms, products, systems, procedures or variables.

The main aim of such an architecture is to form a mental model in the minds of the following stakeholders:

- a) Who will be involved throughout the lifecycle in either implementing this architecture (e.g. IT, CIO)
- b) Who have a direct (e.g. Network, CTO) interest in the architecture
- c) Who have an indirect interest in the architecture (e.g. Business Representatives)
- d) Depict end to end processes that are required to support the customer and manage the business

TIAB Strategic Platform – Conceptual Architecture

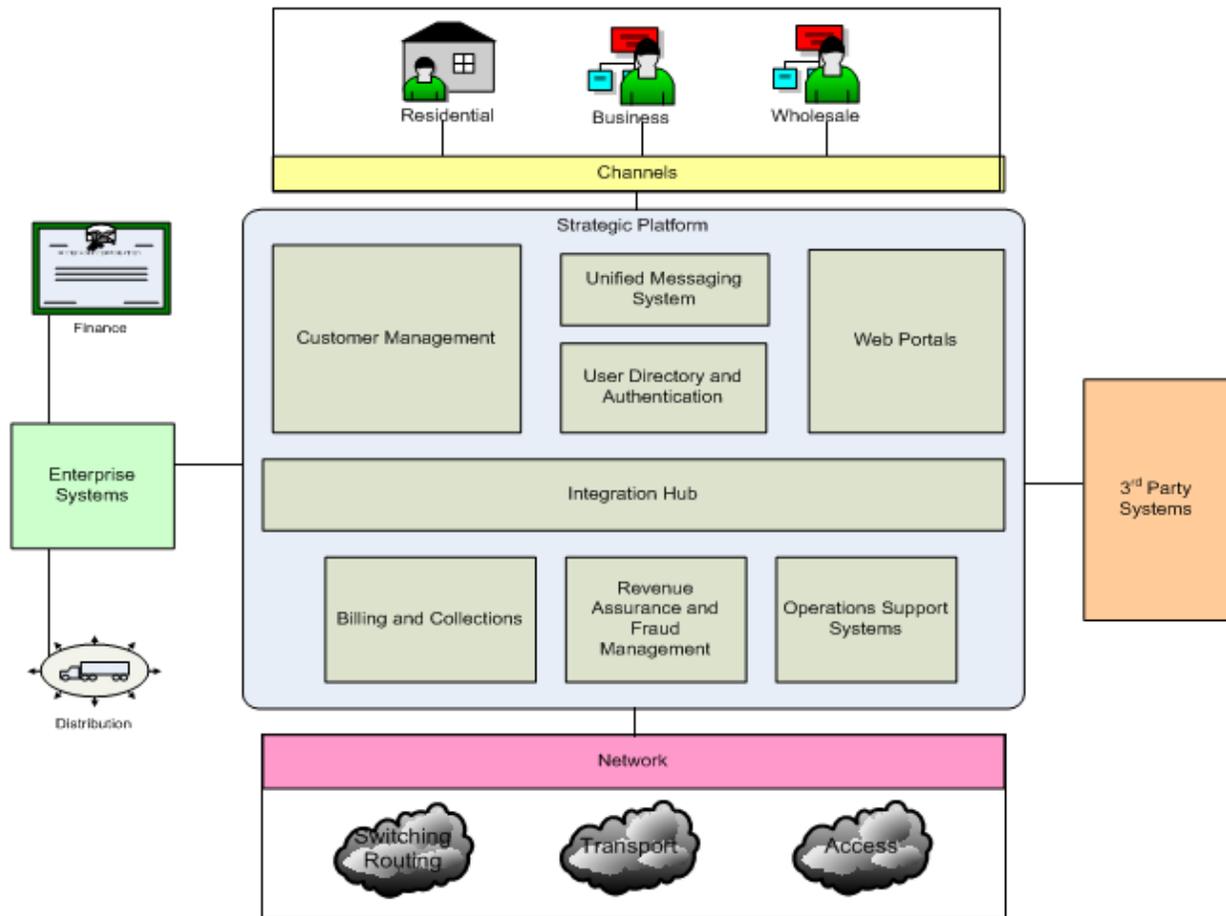


Figure 3.1. Strategic Platform – Conceptual Architecture [*3]

Component Architecture

The Component Architecture represents Level 1 - the next level of architecture definition for each of the components listed in the Conceptual architecture diagram above.

Level 1 eTOM model

- a) Develops a scope identifying all the systems
- b) Focuses and emphasizes on customer priority process like Fulfillment, Billing and Assurance
- c) Distinguishes and highlights the importance of marketing processes
- d) Defines operations support and readiness

Assumptions

The platform will support small to large scale existing and new telecom operators.

- 3 Million customers
- 5000 orders/day
- ≤ 10 day fulfillment cycle time for wireline, broadband, IPTV customers
- Zero-touch flow-through cycle

The design assumptions of the individual components are outlined in their respective sections.

OLO Strategic Platform – Component Architecture

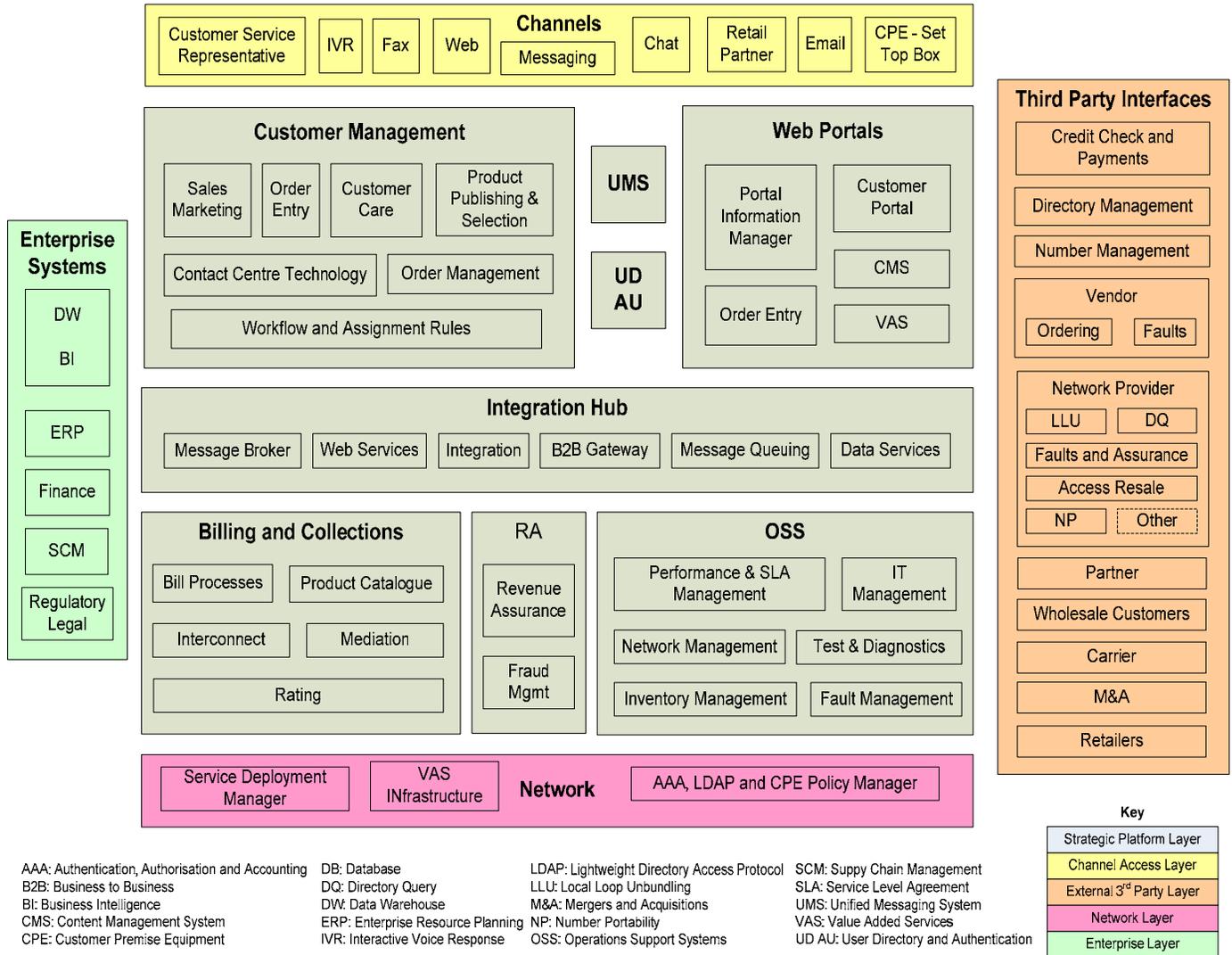


Figure 3.2. The Strategic Platform – Component Architecture [*³]

Component Design

The Component Design shows how the high-level components will interact with each other in a telecom operator’s enterprise.

Component Diagram Convention

The component diagrams throughout the document show how the components interact with each other.

The component that is being described in each section of the document is colored in Orange and is typically found in the middle of the diagram and resides within its component domain.

An example of a component domain is billing which encapsulates all the components that correspond to the billing domain. The components within the domain are shown in yellow.

The components that communicate with the main component are shown as external and internal components.

An external component, shown in blue, can reside within either operator's boundary or outside.

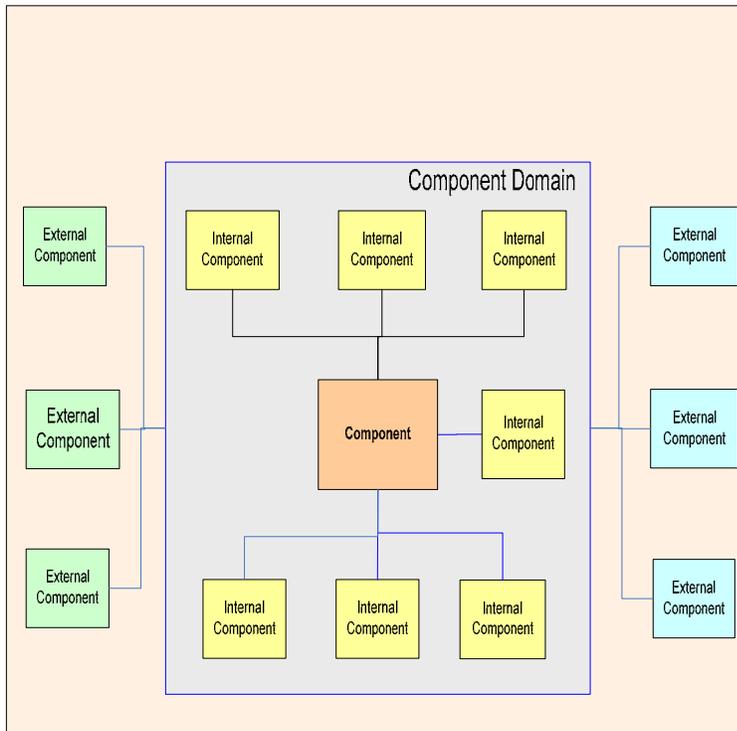


Figure 3.3. Component design convention

3.1. Channels

This section describes the various channels that act as touch-points for customers to interact with telecom(consumer and business).

Through each of these channels, customers can perform a variety of actions such as obtaining information, ordering products and services, activating features, raising complaints, seeking technical support, bill payments, etc.

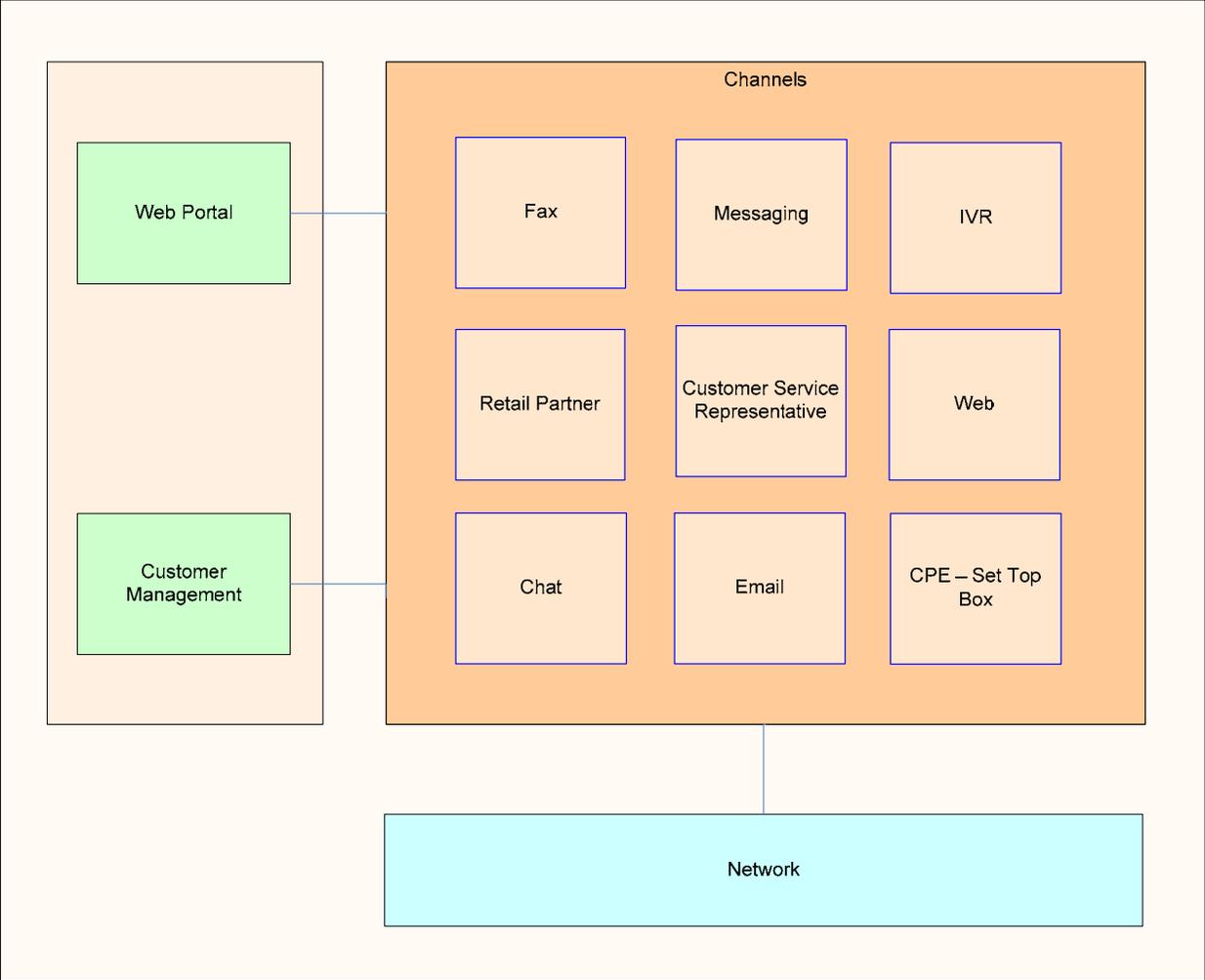


Figure 3.4. Channels High level Architecture

3.2. Customer Management and Order Management

The CM application provides customer service, sales, and marketing automation capabilities for a Telco. In specific, the CM application will be the single front-end to be used by the customer service agents providing a superset of functionality to support sales, interaction management, order management, billing, marketing, and other customer service transactions.

The CM application will integrate tightly with the hub using standards based EAI capabilities. It will also have point-to-point integration with contact centre technology for computer telephony, intelligent call/work routing, outbound calling and contact management.

The application will be used to provide quality customer service, track customer interaction history across all the channels, provide capabilities to create new product bundles, dynamic pricing, create and execute target campaigns, use information to segment customer base, and refine target offers.

For more information on the requirements related to this section, please refer to the following sections in the Strategic Platform – Business Requirements document.

3.2.1. High-Level

Architecture

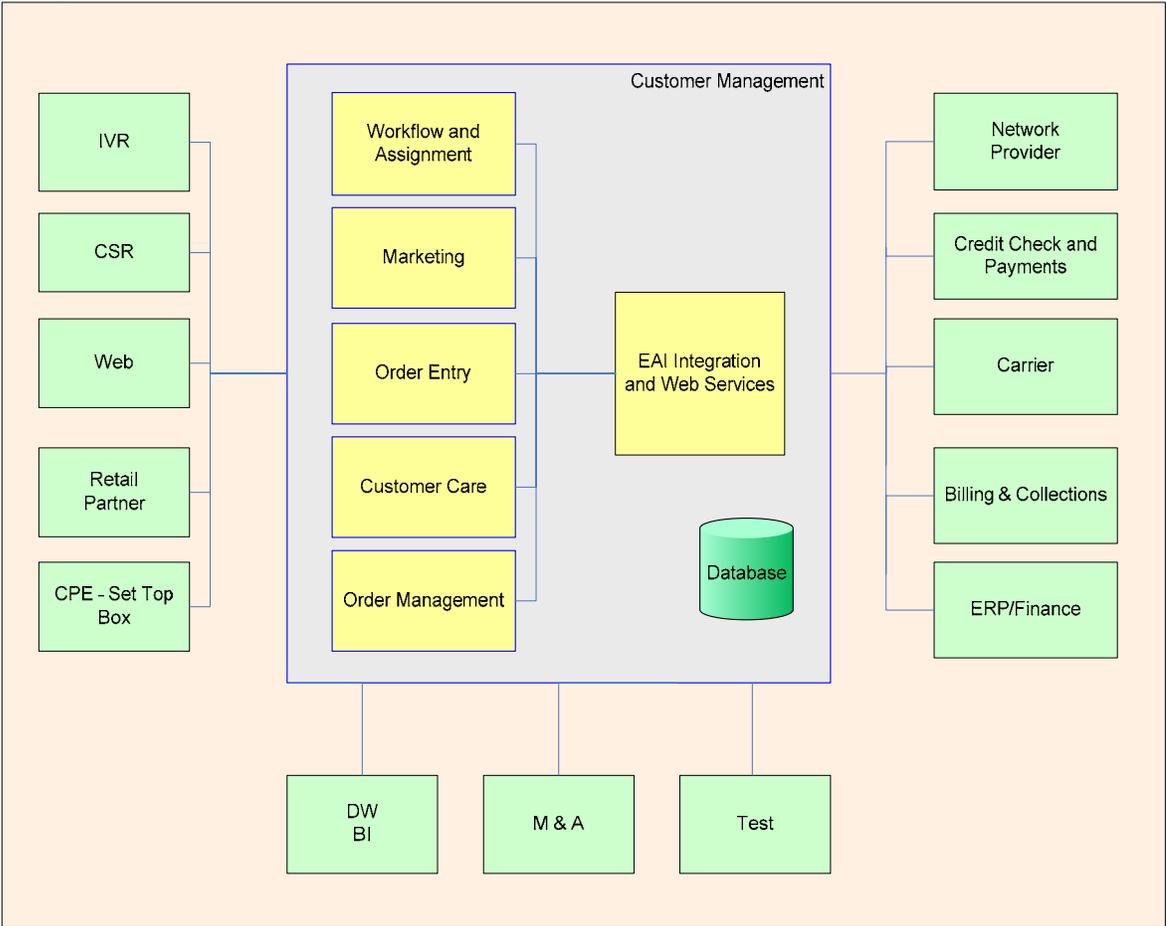


Figure 3.5. Customer management high level architecture

3.2.2. Assumptions

- The CM application will be the central repository for all customer data
- CM application will be the front-end application used in the call centre and provide all information to users by integrating to various applications through the Integration Hub
- It will be used in the call centre for order entry, customer care, order management and jeopardy management
- It will have a robust workflow engine which will work in conjunction with the integration hub for complex process automation.

3.2.3. Description

The customer management application is responsible for managing the end to end customer lifecycle – Acquisition to the end of the relationship. The application acts as a central repository for all customer information and interacts with various internal and external applications through the integration hub. It will also contain an audit trail of all changes to customer profiles. It will be possible to revert to earlier versions of customer profiles if necessary.

An important aspect of customer management is the workflow and assignment management function. This drives the process automation for order management and other customer service functions – for e.g. payment management, profile management, dispute and trouble ticketing management, interaction from other channels (Web, IVR).

3.2.4. Sales and Marketing

The CM application will have the capability to analyze customer prospect information and track the lifecycle of a prospect – opportunity to order and up-sell/cross-sell to a ‘turned up’ customer. The application will be used to enable a sales process for opportunity tracking and execute sales methodology which tracks the ‘prospect to customer’ lifecycle. The system will also be able to track sales person/team against closed opportunities and orders. This information will be used to track and calculate incentive compensation.

From a marketing standpoint, the system will be capable of creating and executing acquisition and retention based campaigns. Campaign management functionality will provide the ability to setup a campaign, business rules around campaign action and execution, associate customers/prospects to a campaign and track the effectiveness of these campaigns. In case of existing customers, campaign management functionality will drive specific actions based on customer value. Actions based on customer value and other personalization action will leverage business intelligence inputs. These actions will include recommendation of products and services to customers based on their profiles.

Communication management functionality will be also available to provide response management for sales, marketing and customer service related contacts. The response could be in the form of an inbound/outbound call, email or system interaction.

3.2.5. Product Publishing and Selection

The CM application will provide a view of the product and pricing information to the various users of the systems. It will also provide the functionality around following key functions:

- Publishing product catalogue providing product bundles and features information
- Collect and distribute requests for products
- Select product(s) for sale to the customer
- Publish appropriate product selection view to various departments
- Validate orderable products and pricing

The product publishing and selection functionality will provide an intuitive UI to facilitate display of multi-level hierarchal products to support telecom company's service offerings. It will also be able to support various combinations of bundles and accommodate dynamic feature rule sets for feature inclusion and exclusion, pricing and discounting.

This functionality will limit order rejections by the provisioning/downstream systems due to unsupported product bundles

The product master will be the billing system.

3.2.6. Order Entry

During the order creation, the main customer access channels (web/partners/call centre) will have the ability to invoke the product catalogue and configure the products based on customer requirements, availability, bundling and pricing rules. At the time of order creation, the customer management application will be able to validate the product configuration based on the rules in the product catalogue around product bundling and pricing.

The customer management application will provide the concept of a customer account, which will be the key entity for use throughout the customer lifecycle.

Prior to order creation, the customer management application will be able to provide pre-qualification of the customer for service availability. The integration points to this and any other

transactional functionality would be based on service oriented architecture – in form of an integration hub providing a common ‘service’ to multiple channels.

As part of the order entry process, the application will create an account with a hierarchy modeled based on the business requirements for e.g. Individual, SME, Wholesale and Enterprise (Corporate) customers. The account will have other entities associated with it such as contacts, addresses and payments. The diagram shown below provides logical relationships which customer management application will store for an account.

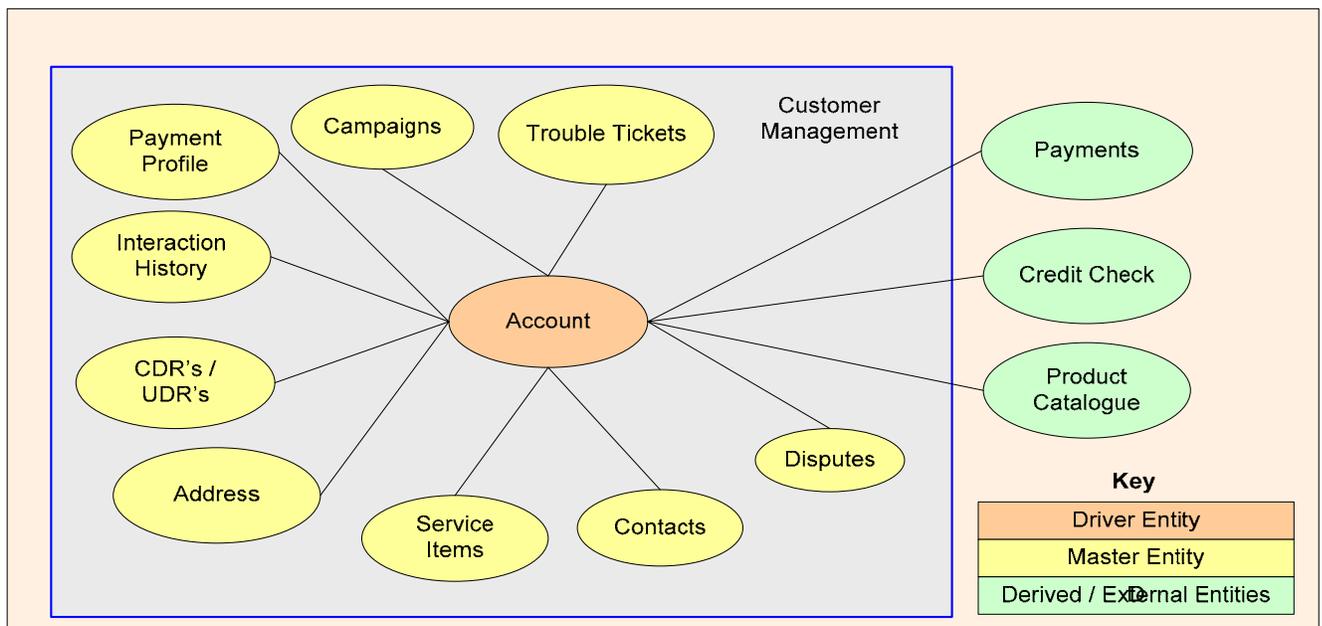


Figure 3.6. order entry diagram

A key component of order entry is the capability to perform a credit check. It is envisioned that the application infrastructure will provide an interface with a 3rd party vendor (for e.g. Equifax) to validate the credit history of the account for service authorization and potentially product selection. The customer management application will have rules and logic in place for credit authentication of consumer, SME and enterprise customers and accordingly decide on the product to be offered and the billing mechanism – (pre-paid or post paid).

3.2.7. Order Management

The customer management application business processes will be used to automate various stages of the order life-cycle. These business processes are segmented based on the services and products associated with the order. These business processes will be flexible and have the capability to be designed and configured based on specific business requirements.

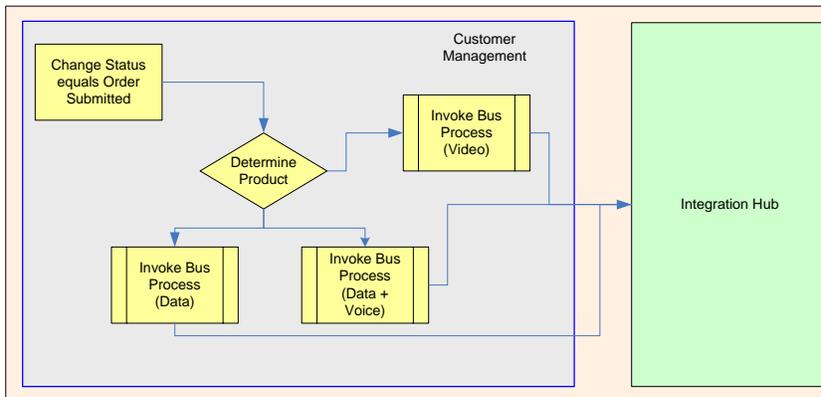


Figure 3.7. Customer management

The order management process will be initiated by the customer management application upon order submission. This order submission action will trigger the provisioning workflow and interactively manage the provisioning process along with the integration hub. While the customer management application will be responsible for business workflow, the integration hub will be responsible for the system workflow.

For example:

Business workflow:

Setup of customer's asset information –

- Setting up CPE information such as serial number, MAC address etc.
- Associating this information to a customer account
- Calculating warranty start and end dates

System workflow:

- Taking a payment transaction from the customer management application (credit card details, billing address, payment amount etc.)
- Splitting that transaction to go to credit card processor and billing system
- Provide summarized transaction result back to the customer management application based on transaction ID.

During the order lifecycle, the CM application will track order status. Optionally, the customer may be informed proactively by the system about the status of the order via email or messaging services. Automated workflow processes will drive movement of an order from one status to another. Additionally, if a particular order status exceeds permitted SLA bounds or enters jeopardy status, the application will provide exception activities to be worked on manually. The status of the orders and its line items will be tracked by audit trail functionality which will provide the progress of the orders at various stages of its lifecycle and can be used effectively to track the order fulfillment process.

In order to manage jeopardy status and complex work orders, the system will provide the use of activity plans and activity management through automated and manual transactions. Although human interaction is envisioned only for exception situations, the customer management application will have the capability to distribute and track workload. Assignment of this workload will be done based on business rules and flexible criteria such as:

- Employee availability
- Department
- Skill sets
- Existing workload
- Product specific criteria
- Geographic location

Escalation rules will be configured to track the work time and activity closure by owners, so that the provisioning-lifecycle for any order can be monitored within established SLA bounds or desired timeframes. The process will also help track the effectiveness of the employees and the metrics can be used to identify bottlenecks and implement necessary corrective actions.

Once an order is completed, asset information will be tracked against the customer account. The assets could be active service items and/or services depending on the products purchased. The system will use these active assets for modifying or disconnecting any service items and /or services.

The customer management application will provide full functionality to perform MACD orders for modifying, adding, cancelling and disconnecting service or service features for a particular customer. Disconnect needs to handle the special case of transfer (and number portability) from operator to a third party service provider.

The application will be designed to provide intuitive and easy to use UI for performing MACD functionality. The customer's account view will give a snapshot of all the active services from which the user can invoke business processes to perform any changes as desired. Business rules for the above processes will be configured to meet specific requirements.

Access control and state model define the visibility criteria of the different screens and data associated with them, based on the user roles, responsibilities and positions in the organization. The application will provide complete control to define the access control mechanism. Access Privileges should be configurable based on role, geography, system in use.

3.2.8. Customer Care

The Customer Care module will provide OLO platform with customer service, trouble ticketing and problem resolution functionality. The call centre/ Web / IVR / retail partner channel will have access to customer care functions but it is envisioned that the superset functionality will reside within the call centre.

The customer care agents will be able to perform a suite of functions such as,

- Service and billing inquiries – order status, profile changes, billing dispute management, and payment profile management, Payment management, repairs & returns management etc.
- Service changes – feature changes, service upgrades / downgrades
- Loyalty rewards campaigns
- 'Saves' or churn prevention campaigns
- Collections management
- Contact Management
- Up sell / Cross sell

Customer care functionality also has an element of customer value management. The concept of understanding, calculating, recalibrating and assigning a customer value will be managed by the customer management application. Inputs to calculate customer value can be through several areas such as – interaction history, usage patterns and payment history, ARPU cost of service. Although certain aspects of customer value can be calculated in real time, important inputs will come from the business intelligence and customer analytics. Customer value can drive customized treatment of customers for service, sales and target marketing.

An important aspect of customer care is trouble ticketing and problem resolution for customers. The application will have complete trouble ticketing functionality to route and assign the tickets to appropriate owners, based on the business rules, which can be configured. The trouble ticket functionality is greatly enhanced if the customer data is integrated with the customer account and asset information.

Subscriber diagnostics will also form part of Customer Care.

The trouble tickets will further have a solutions view, which will automatically navigate through a knowledge base to identify the possible solution to the problem and prompt the call centre agent with possible solutions.

Call centre scripting is another component of customer care, which uses dynamic workflows to guide users through complex tasks. This functionality is useful especially in cases of newly trained agents.

- It can be deployed on a website to enable users interact with a Question and Answers session, simulating an experienced call centre agent.
- Also, can guide the call centre agent with correct sequence of steps, if a call is routed through an IVR.

In addition to troubleshooting, the scripting can also provide users and call centre agents with capability to run surveys, provide ‘how-to’ steps and other Instructions.

As part of customer care functionality, the application will implement business processes, which can enable call centre agents to assist customers with returns, repairs and exchanges (RRE “Returns Repair and Exchange”). The call centre agents will be provided with user friendly screens to process RRE for equipment and accessories based on business logic defined by OLO.

The RRE process will be integrated with external / internal applications such as inventory management, provisioning and billing to handle variety of permutations on returns and exchanges. The customer care module will also have capability to handle payments, adjust payments and resolve any disputes by customers in terms of billing for usage.

3.2.9. Workflow

The customer management suite will have the capability to provide a set of tools for process automation workflow provides a set of tools and a workflow engine to graphically define, automate and manage the business process and application flow.

The business process automation includes processing work, routing and assignment, escalations, notifications and integration to an external system using the integration hub.

Typical Process would include:

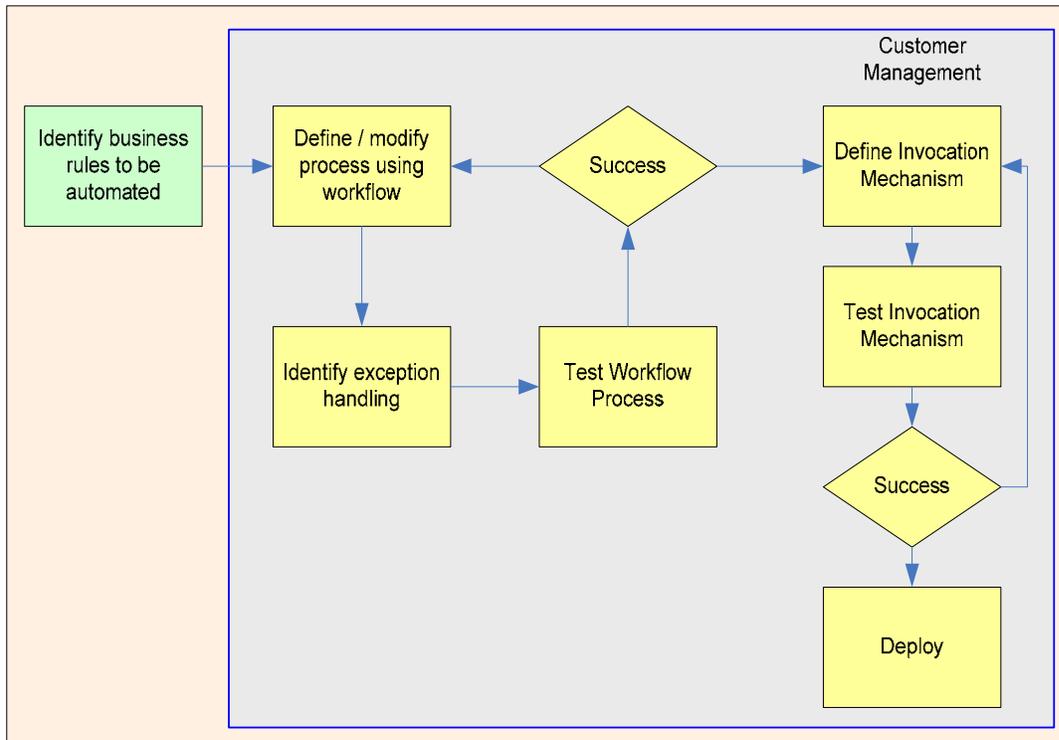


Figure 3.8. Work flow process

Workflows can be defined and configured for all the modules/components and sub-components of a customer management. A few examples include:

Sales and Marketing

- Creating / execute a Campaign
- Executing Sales Methodology

Order Entry

- Product and feature validation
- Order creation
- Service availability
- Credit check

Order Management

- Provisioning Integration – voice and data subsystems
- Send and capture details from POE and Firm Order
- Installation scheduling
- Modify, Cancel , Disconnect process
- Add additional line items

- Billing integration and Inventory management

The Workflow system provides the mechanism to place common sub processes within the main process. This allows easier audit and KPI analysis as product streams can be grouped into higher level structures that are easier to break down. An example of a common sub process may be service activation where a particular type of sub process may be called depending on the technology components being provisioned.

3.2.10. Assignment Manager

The task assignment functionality uses business rules to define how a task is assigned to appropriate people. For e.g. assign sales tasks to sales people based on their geographical area and assign service tasks to service agents based on areas of expertise, workload and availability.

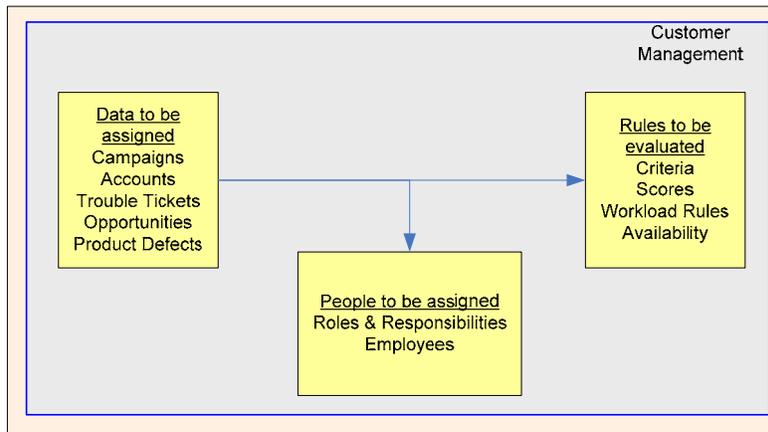


Figure 3.9. Assignment manager

The assignment manager will be used in the application for the following.

- Assign activities to owners for provisioning in order management cycle
- Assign trouble tickets to owners based on skill set and work area
- Escalations and Notifications will assigned to Managers / Supervisors
- Assign accounts/opportunities /orders to sales team for incentives/commissions management.

The system will also provide a mechanism to track and manage incentive compensation program.

3.2.11. Contact Centre Technology

The term “contact centre technology” in the context of this document includes call centers, IVR, CTI and ACD platforms.

This section should be read in conjunction with UMS and Customer Care (section 3.2.8) as the overall solution will be delivered by a combination of all three components.

Contact Centre Technology, in conjunction with the UMS will provide a multimedia experience to the customer and CSRs with regard to their interaction. The UMS platform, which will act as a repository for customer interactions. Multimedia will incorporate information exchange in various forms such as voice, chat, email, video, audio, messaging, etc. This will be applicable to both Pre-Sales and Post Sales activities.

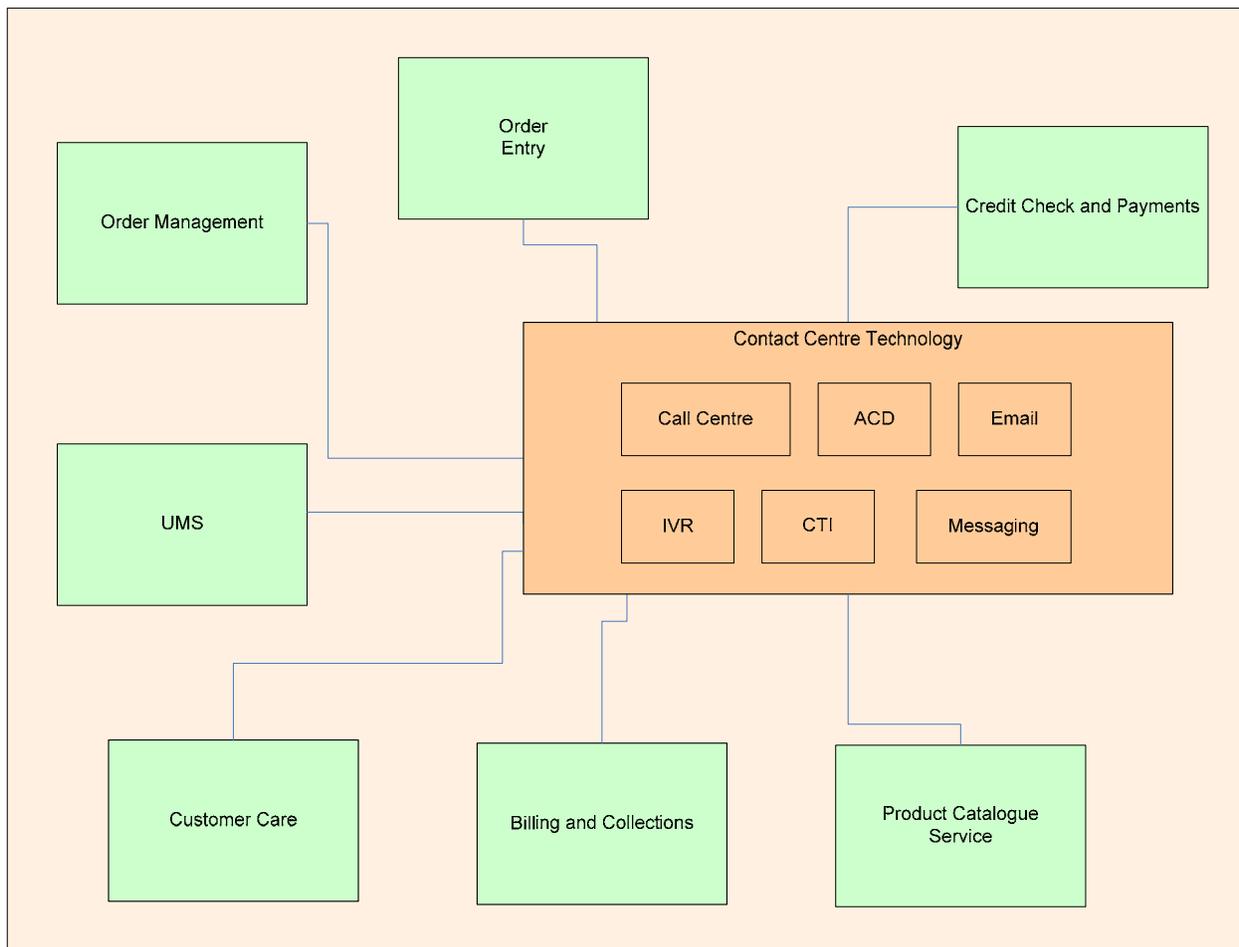


Figure 3.10. Contact Centre Technology High Level Architecture

Where relevant and possible, contact centre technology decisions (e.g. email response, SMS or MMS response, etc.) should be automated.

3.2.12. Email, Messaging and Chat

Email will be routed through an Enterprise messaging system (see UMS) that will act as a pseudo-IVR. This system will have the capability to recognize the context of the email as well as sense the mood of the communication through the use of NLP technology.

Depending on the subject, the context and the mood of the email, it may be routed to different call centre teams with relevant skill types to progress the customer's request or the response may be automated.

The email management system will be automated and provide efficiencies in handling the rising number of emails contacts.

Messaging involves communications with customers through the use of SMS or MMS. These will be carried out through the UMS application that will act as the communication channel. This may need interconnection with SMSCs or MMSCs. The messaging component will also interact with the NLP component for advanced analysis.

Customers may also be able to initiate Chat (Instant Messaging) sessions with Customer Service Representatives through the web. These sessions may be initiated through the Customer Portal sub-component in the Web Portal.

3.2.13. Call Centre

The call centre channel will leverage automation technology for call and work routing. Elements of call centre technology will include an ACD (switch), CTI infrastructure and Workforce management. All this technology will support multiple call centre locations. Call centre number routing rules at a base level will include factors such as time of day; day of week; phone number; geography, etc. Other detailed routing mechanisms will leverage a combination of IVR, CTI and ACD events and statistics.

It is envisioned that the call management infrastructure will leverage a network based IVR. There will be an option to deploy a Call Centre based IVR. This IVR will provide a rich UI to all incoming calls and will work with CTI rules engines to determine best routing option should a call need to be transferred to a live agent. Some of the routing rules could be based on agent availability, queue hold time, customer value etc.

A workforce management application will provide the management of call centre staff and provide the functionality to run shift bids, manage agent productivity, and manage call centre service level and other metrics like average speed of answer, hold time in queues etc. It will also manage allocation of agents to multiple skill groups and vice-versa.

The Call Centre will contain a knowledge base of FAQs and technical support that will be accessible by CSRs.

CSRs will be given an option to either record all voice interactions with customers or to switch recording on/off based on their preference.

3.2.14. CTI (Computer Telephony Integration)

Computer telephony integration (CTI) provides the customer management application the capability to understand and utilize customer information to provide rules based actions prior to transferring the customers' query to a call centre agent. Basic elements of CTI include call management functionality like:

- Event based screen pops with customer information displayed to a customer care agent prior to receiving calls
- Intelligent call routing – Close collaboration between the IVR, ACD and CTI will allow for call routing rules based on agent availability, call wait times, agent skill set etc.

Additionally, CTI will support multi-channel interaction such as non-voice interactions such as email management, web chat management etc.

There is also the possibility to provide outbound call management as the contact management data is held with the Customer Management layer. This will be integrated with predictive dialing capabilities for outbound preview and predictive dialing.

3.2.15. IVR (Interactive Voice Response)

IVR is one of the channel through the customer can interact with the telecom system. This is one more order point through which the user can track the order status, check status of TT, get information about service outages, can check bill details, etc.

IVR component will be interacting with other components for information exchange when specific data is required from other components. The Integration Hub will be used as a communication channel between IVR component and other components.

3.3. Web Portals

The Web portal will provide the static and dynamic facilities via the Web channel. The portal will be made up of several software components which will interact with each other to provide a single look and feel to the end user or retail partner. The physical appearance will be configurable dependent on the customer channel being served.

For more information on the requirements related to this section, please refer to Section 8 - Web Functionality in the OLO Strategic Platform – Business Requirements document.

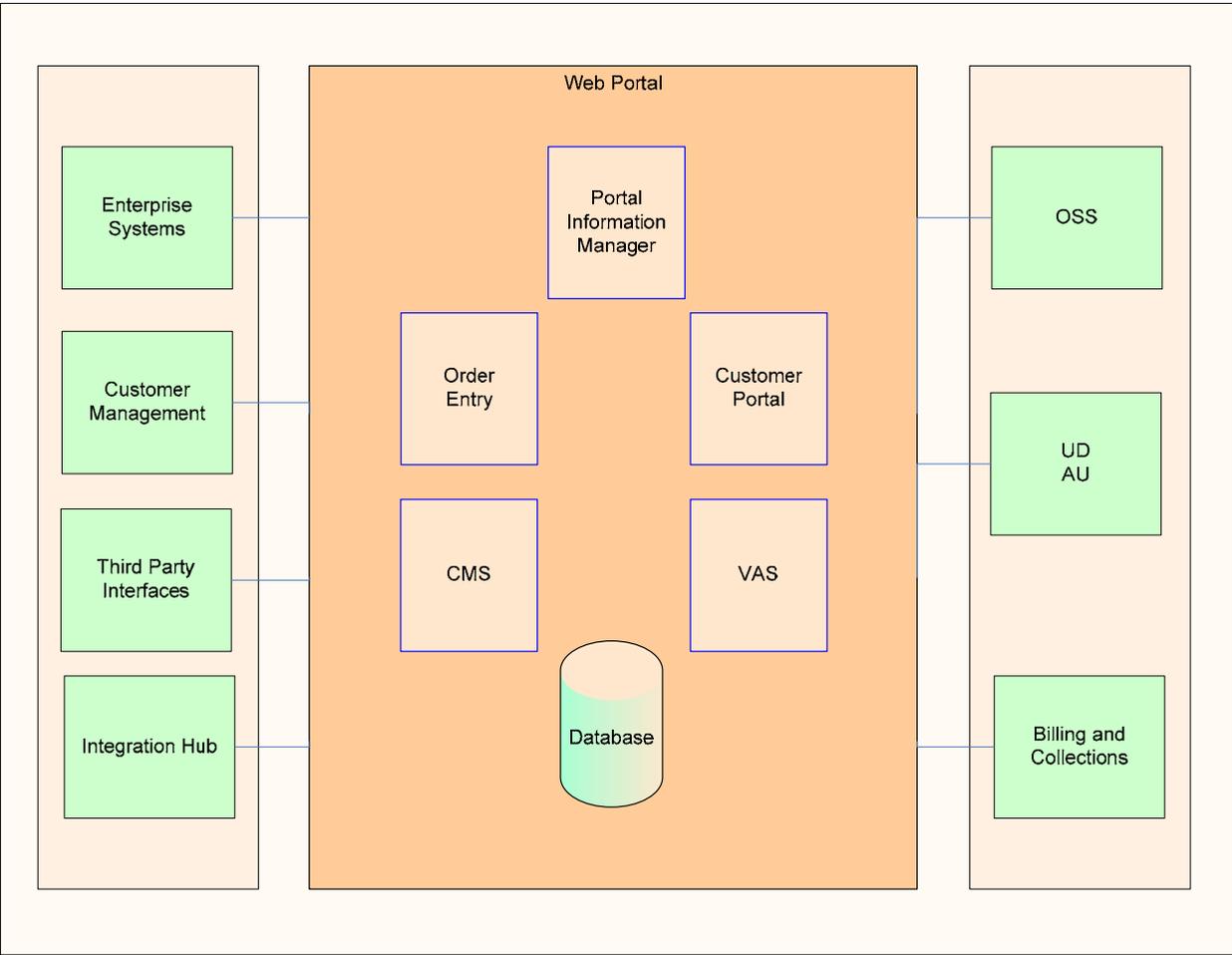


Figure 3.11. Web portal high level Architecture

The customer will be able to

- Place Orders
- Track the status of their orders
- Report and track trouble tickets
- Manage personal and service profile information
- Activate/Deactivate features

The following static content will be provided from the portal

- FAQ information
- Sales and marketing

The following dynamic content will be provided

- Customer profile information
- Product publishing and selection
- Bills and usage data

The Content Management Service (CMS) will provide static content.

Value Added Services (VAS) (e.g. movie downloads, streaming audio and video, upload pictures, web mail, virus protection, VPN services, web space etc.) will be provided through the web portal.

The web portal will be integrated with the other main components in the enterprise or external systems via the integration hub. The exception to this would be content streams, which are specific to the portal components only.

The components inside the web portal will communicate with each other through standard defined interfaces.

The Integration hub will be used as a communication bridge if a web component wants to communicate with an outside component.

Modules of Web Portal

- Portal Information Manager
- Order Entry (OE)
- Customer Portal
- Content Management System (CMS)
- Value Added Services (VAS)
- Database

3.4. Portal Information Manager

This component of the Web Portal is responsible for managing the presentation of company content on Telecom Company's website. The CMS acts as a content source provider to the Portal Information Manager. The Portal Information Manager provides

- Corporate information
- Product and service information
- Promotional data

This component will retrieve its product and pricing information dynamically from the 'product catalogue service' component of the integration hub.

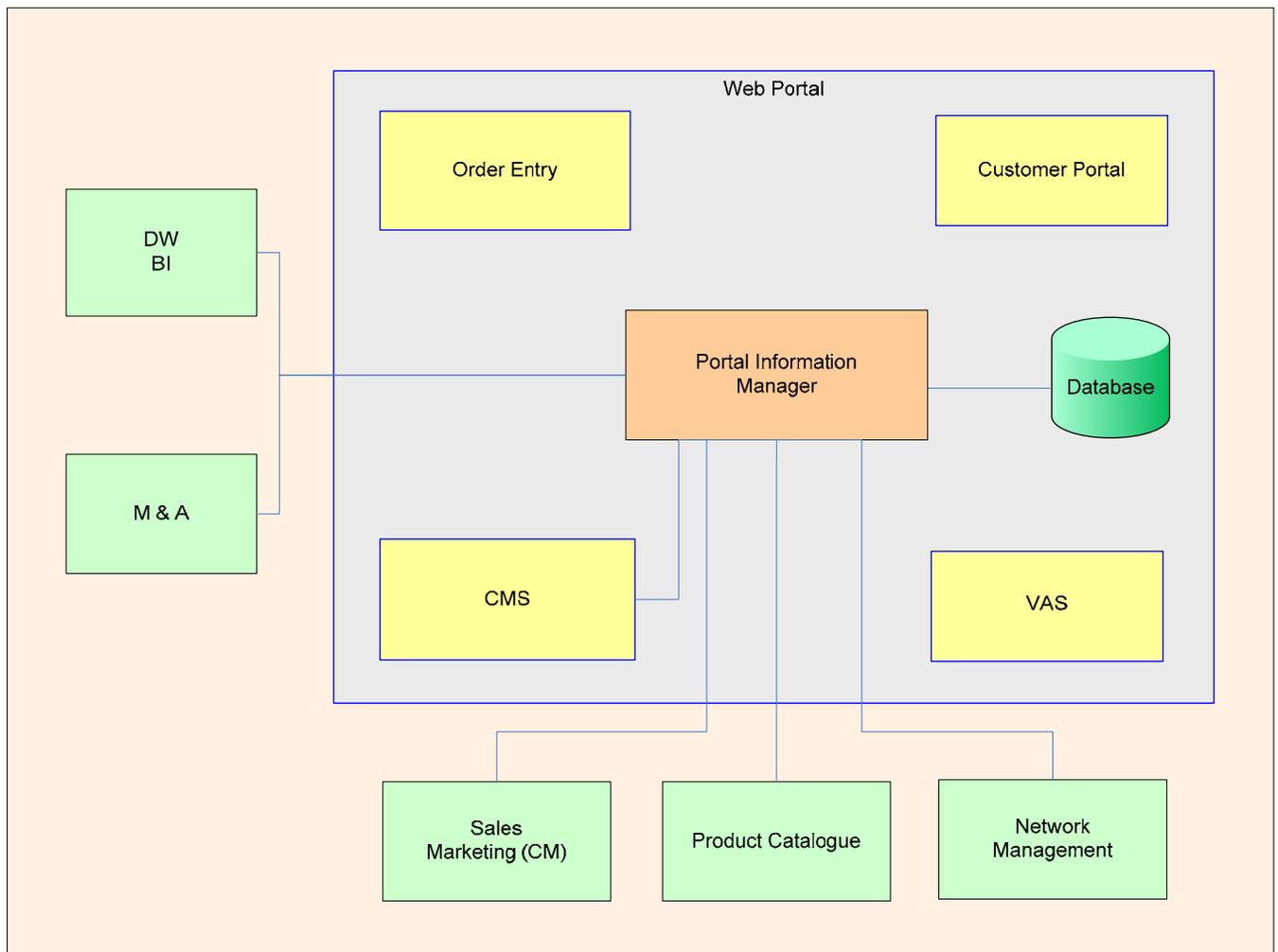


Figure 3.12. Portal information manager high level architecture

The Portal Information Manager component will have the capability to publish marketing data and sales campaign data on the web. The campaigns will be created in the customer management system using the sales marketing component.

The Portal Information Manager component should be capable of managing static data or dynamic data.

The Information Publisher Component will communicate with the integration hub to check the Network Status. This will provide information on planned outages and faults in the network organized by geographical area.

Portal will display product catalogue configured in CRM for customer to choose from the product list.

The Information Publisher Component will communicate with CMS inside the web portal to display the static data.

3.4.1. *Order Entry*

The Order Entry component provides the customer with the facility to order products from telecom. To the end user the order entry is shopping cart functionality, which allows them to select from the range of products available and then proceed to a check out where the confirmation on the order is made. Confirmed order is validated and forwarded to the customer management component.

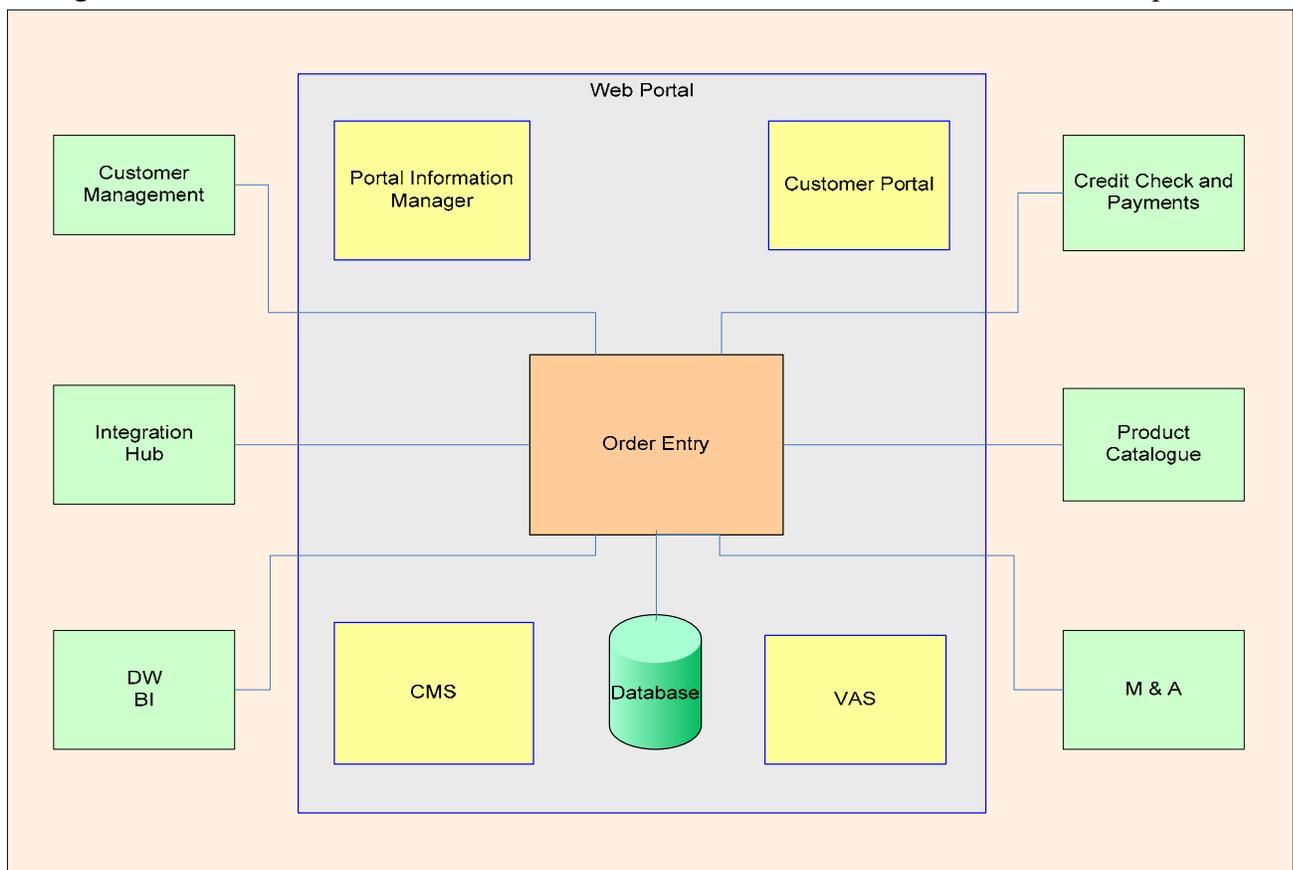


Figure 3.13. Order Entry High Level Architecture

As part of processing, the order entry component will interact with the Product Catalogue to fetch the data about telecom companies products and services. Out of stock components will be handled in a special way and treated as a near sale.

Lookup data will be held in a persistent cache. The cache refresh frequency will be dependent on the business rules for each component.

The Order Entry Component will provide the following features

- Order tracking
- Product Catalogue information
- Credit Checking
- Payments

User is provided with unique order number for tracking purposes.

3.4.2. Customer Portal

The Customer Portal will provide existing customers with support, information, channel to access certain services (e.g. VAS).

The services will include

- Manage profile
- Track Order status
- Place new order
- Modify current service settings
- Trouble Ticketing
- Network Status and planned outages
- Password Management
- Personalized look and feel
- Access special services such as VAS (e.g. gaming)

Portal will interface with IT systems to exchange information with these systems.

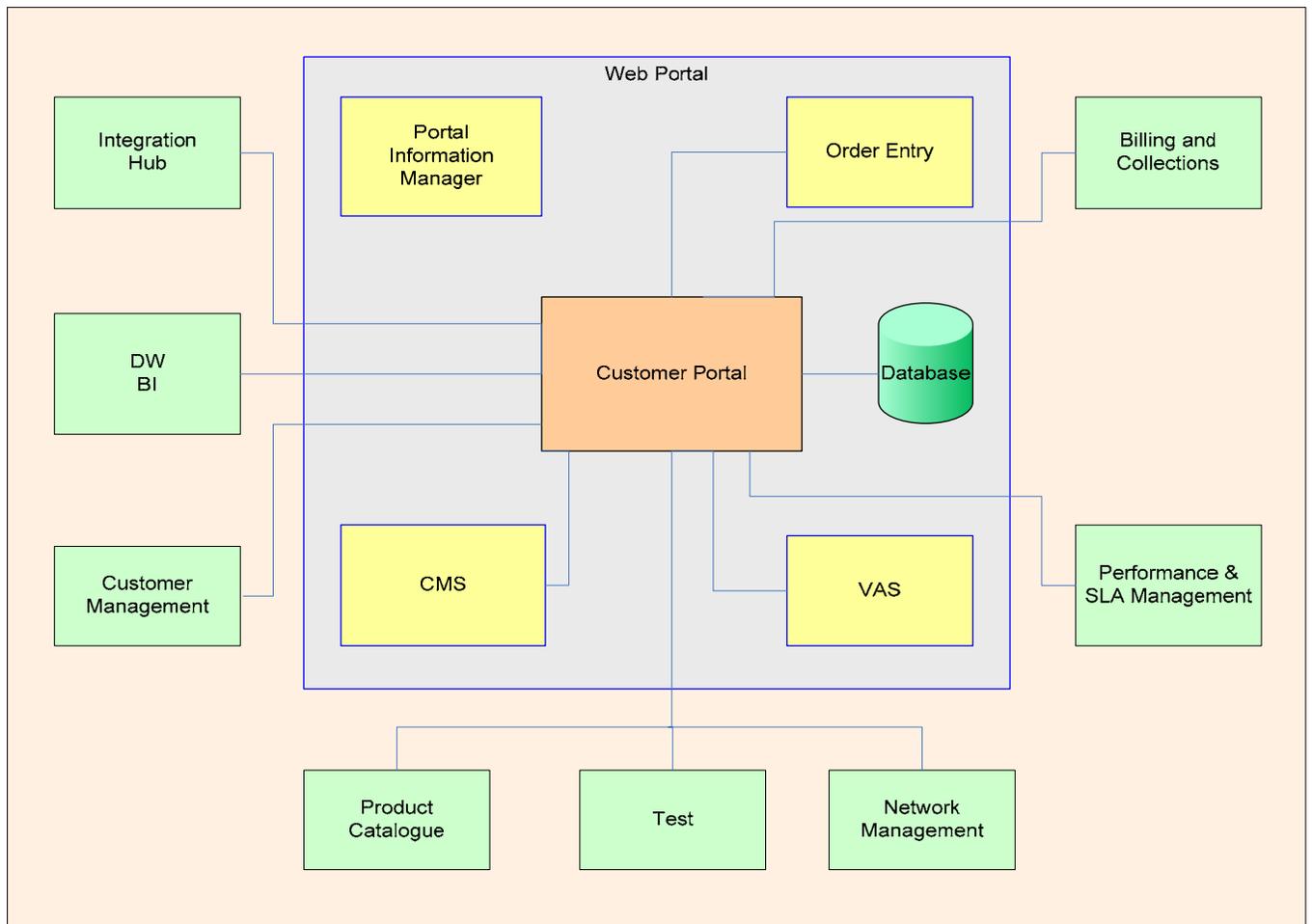


Figure 3.14. Customer Portal High Level Architecture

Order entry

If the customer wants to place a new order from the web they may go to the shopping cart area or may use a mechanism such as click-and-buy. The customer can browse through the product and services offered by the Telecom and pick a product or service as per the requirement. At the end of this process customer will submit the order for processing

Order management

Order Management component will be responsible to store the order details received from the Order Entry component. Order management component will return the user unique order number. Using this unique number the user can track order status.

Product Catalogue

The user can browse through all the product and services offered by the Telecom along with cost for the product or service. The Product catalogue component will deliver all the products i.e. in stock and out of stock. Out of stock products will be handled in a special manner i.e. a near sale.

Customer Management

The Customer Management component can be broken down to the following sub components-

- Profile management
- Trouble Ticket(TT) management
- Check service usage details
- Check Service Levels delivered

Profile management

Profile Management component will manage the user profile. Customer will be able to edit profile using this functionality. The updated profile will be stored in the customer management DB. This information will be updated in dependent systems in real time.

Trouble Ticker (TT) management

In case of service faults or support customer will raise a TT with the operator. The user can also check the status of their old TT's. TT information will be updated in downstream systems where applicable.

View bills

With the help of this component, the user can check his or her bills online on web. User can save the bill on his or her local machine or can take a print out of the bill.

Check service usage details

This component helps the user to analyze call usage by accessing the service usage information, which is made available from the integration hub. Users will be able to choose different filter and sort criteria

SLA (Service Level Agreement)

Business users can view service levels delivered and monitor the SLAs agreed with Operator.

Service modification

The user can modify existing service details at any time while he or she is customer. The customer can add or remove certain features from their existing services. The modification will be treated as a new order for the system and the charges levied will be displayed to the user before they proceed to the check out facility. Any modification in the service will be stored in the customer management database.

3.4.3. Content Management System

Static Data (e.g. company information) and Dynamic data (e.g. news feeds) will be stored in the Content Management System which will be responsible for managing its appearance to the end user. It will allow content to be provided by non technical users removing the need for technical support to be involved in deployment of sales and marketing information.

The component will provided the following features

- Template management
- Document management
- Image management
- Navigation management

Template management component is used to define content layout for web pages. Administrators have the permissions to create templates, and can provide content at the time of template creation. Users will have permissions to create documents based on these templates and add their own content.

CMS will store data in a local database. The CMS will not interact with any component outside web portal. CMS can be used as the data source for Portal Information Manager Component.

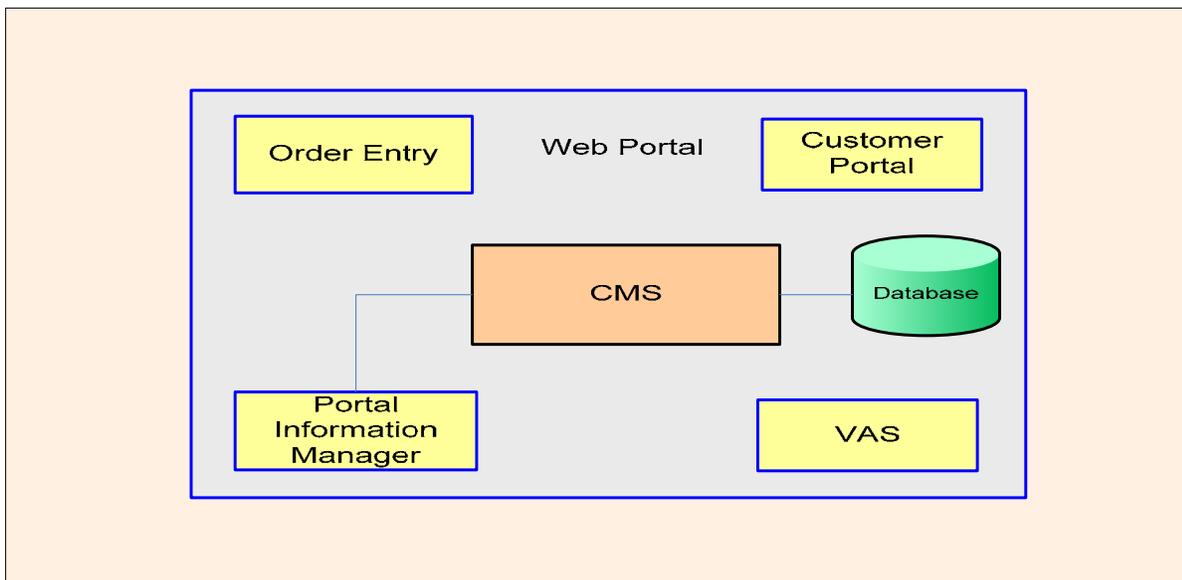


Figure 3.15. Content Management System High Level Architecture

3.4.4. Value Added Services

Value added services are services that are add-ons to basic services. Examples of value added services are Video, Audio, Gaming, web mail, web space, picture galley etc.

These may in turn stimulate incremental demand for basic services (e.g. increased bandwidth needed to deliver Video on demand or TV over Broadband).

VAS typically will be provided by telecom or partners' (third parties). The management of these services may be carried out either by telecom or outsourced to the partner (e.g. Content Provider).

VAS may be provided as promotional vehicles (e.g. free movie download), may be subscription based (e.g. Live TV channels such as Sports, etc.) or may be paid per-event (e.g. Video on demand).

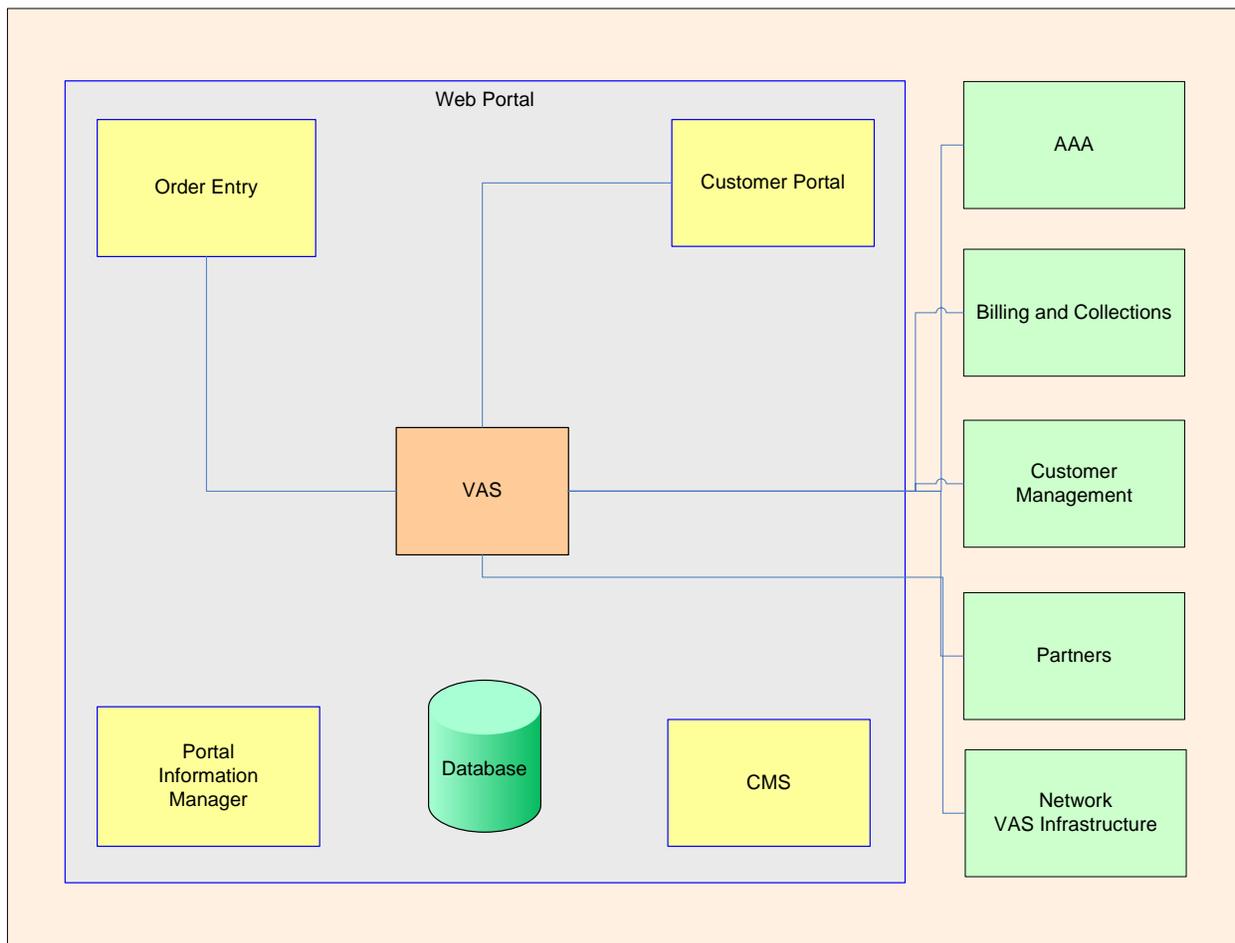


Figure 3.16. Value Added Services High Level Architecture

3.5. Billing and Collections

Rating, Mediation and Billing systems will interact with various components in the Conceptual Architecture and will play a key role in the accurate recognition and realisation of collected revenues and incurred costs surrounding CDR, EDR and ad-hoc debits and credits. In addition to the Rating, Mediation and Billing processes a number of functional modules reside within the architecture providing inter-network accounting and 3rd party settlement functionality.

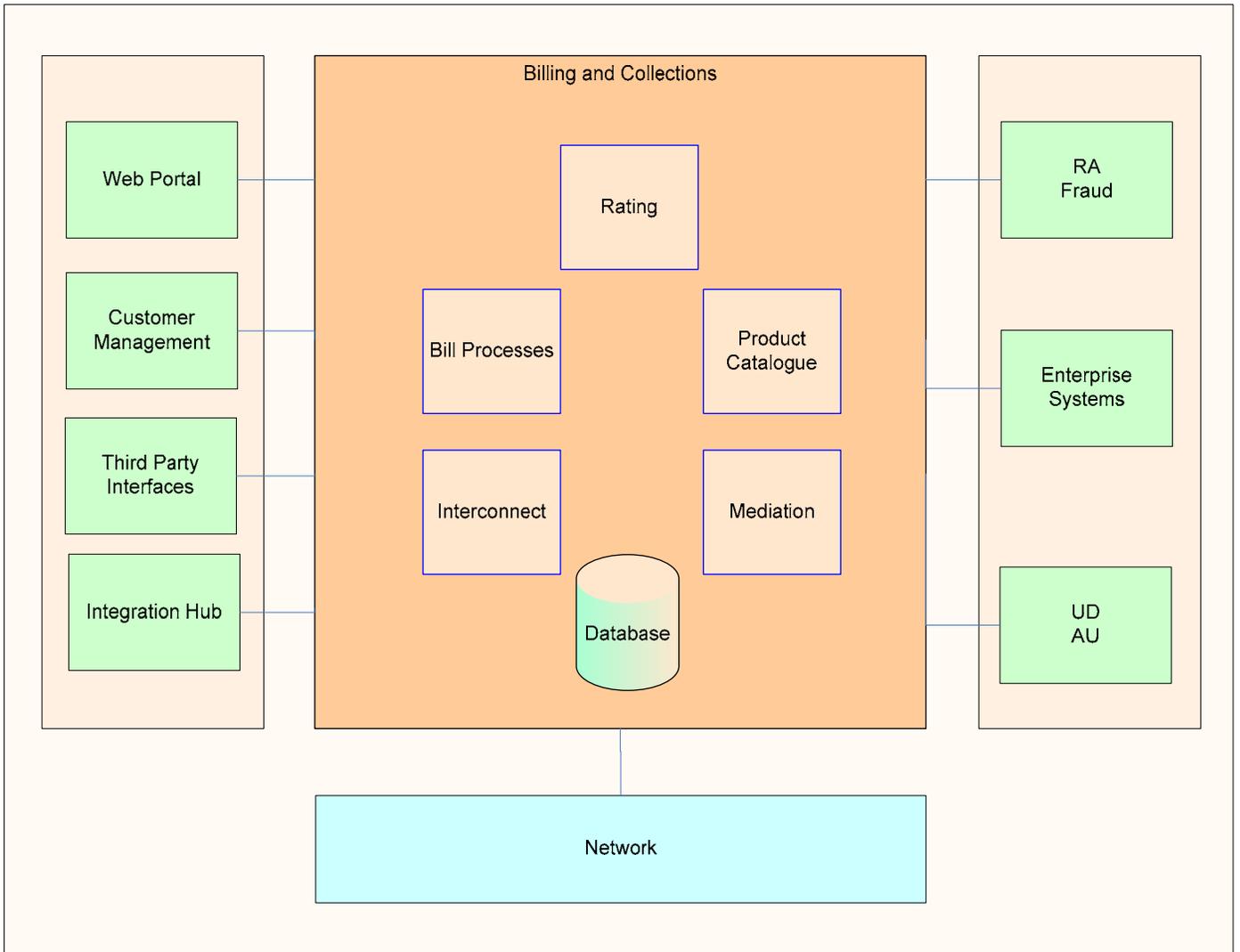


Figure 3.17. Billing and Collections High Level Architecture

Independent policing of the entire architecture in order to give assurance of all network generated revenues and costs should be provided in the scope of an RA application and in order to prevent internal and external fraud an independent FDS application.

For more information on the requirements related to this section, please refer to Section 7 - Billing and Collection in the OLO Strategic Platform – Business Requirements document.

3.5.1. Mediation

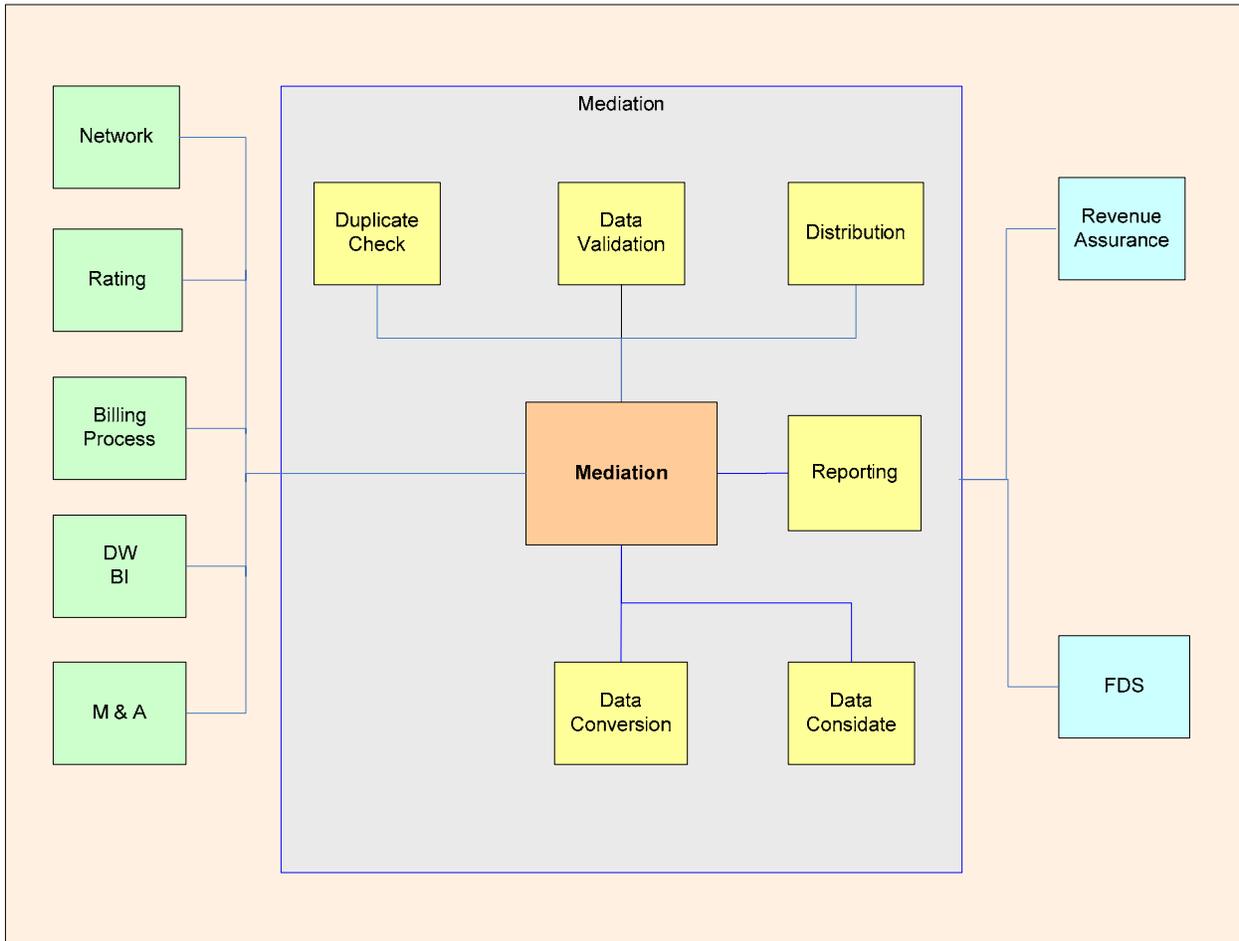


Figure 3.18. Mediation High Level Architecture

The mediation system will sit at the centre of the conceptual architecture and will act as a conversion, validation and distribution system.

The system itself will interface with number of predefined systems receiving and distributing network CDR/EDR's be they rated, unrated, billed or information only to designated systems such as rating, billing, RA, Fraud and Business Intelligence.

The Mediation platform is split into the following key components:

- Duplicate checking
- Data validation
- Data conversion
- Data consolidation
- Data Filtering
- Distribution
- Reporting

3.5.2. Duplicate Checking

Duplicate checking will monitor received data files and apply a predefined logic in order to check for duplicate files and or records. The function should have the ability to suspend any file or records received which meets the specified criteria. Once suspended, users will have the ability to report, analyses and drill down on suspected duplicate files/records whereby find the cause, analysis can be perform leading to the resolution, correction and resubmission of the identified files/records.

3.5.3. Data Validation

Data validation processes will check all received files against predefined and expected formats of files and records. The process will also validate that all data distributed to relevant systems is received and accurate.

3.5.4. Data Conversion

The mediation system will receive from a multitude of different sources in a number of different formats. Records from the telephony network such from elements such as soft switches, SMSC's & MMSC's, real-time charging gateways and 3rd parties such as clearing houses and 3rd party mediation platforms.

The system will maintain a generic conversion format or can be destination specific for handling by downstream systems such as rating, billing and BI.

3.5.5. Data Consolidation

Functionality to consolidate partial CDR's in the event of extensive usage. Partial CDRs will be held until the event has terminated whereby the records are consolidated in to a single call record before distribution to rating.

3.5.6. Data Filtration

The mediation system will have the ability to filter CDR/EDR's according to predefined business rules. The network produces a number of different call records associated to many different call

scenarios some of which have will require rating, those which don't and are not required for billing can be filtered out and distributed to information systems. For example the business may decide not to process events to a VM platform and charge a recurring charge for such features. In instances such as this the ability to filter out these types of records should be controlled within the mediation system.

3.5.7. Distribution

Mediation will be able to process and convert into a common format or into a format specific to the recipient system.

Distribution points are configurable and additions can be added and controlled from within the system. Typical distribution points are as follows:

- Rating
- Billing
- Financial systems e.g. General Ledger
- Business Intelligence and Enterprise Data Warehouse
- Network reporting tools

Configuration of distribution points should be exhaustive, the ability to introduce new components in the architecture and control the distribution flow of data.

3.5.8. Reporting

Detailed statistical reporting should be available providing a complete picture of the processes within the mediation platform. Typically the reporting will give a view of all data received from each particular source how many records were processed for distribution and the number of erroneous records which have failed processing.

3.5.9. Rating

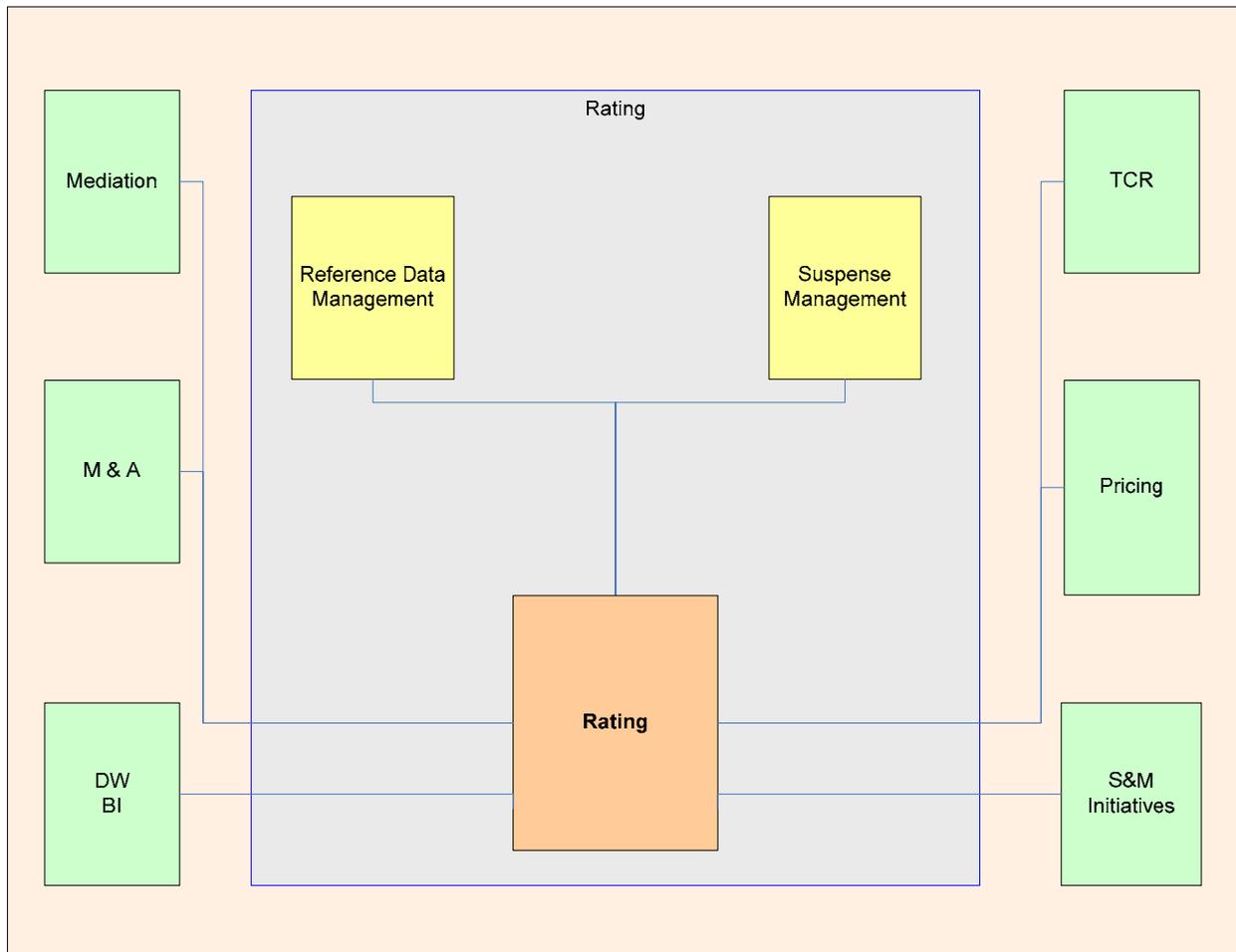


Figure 3.19. Rating High Level Architecture

Rating will receive usage records from the mediation platform and will rate or cost CDR/EDR's according to rules which have been set-up within the rating engine. Product and service information will be updated in the rating system by the Product Catalogue from billing system.

Rules will be configured enable the rating system to rate numerous different types of CDR/EDRs generated from the core network. CDR/EDR's will be rated according to the service, call type or scenario which was initiated. The records will be passed to the mediation platform for distribution to billing, RA, Fraud and Business Intelligence.

Key components within the rating module are Suspense Management and Reference Data Management.

3.5.10. Suspense Management

In order for record to have a rate or cost associated to them a number or predefined criteria must be met, failure to do so will result in records falling into suspense.

The reasons for records suspending are numerous relating to both service specific and customer specific profiles. Bad or missing reference data will result in records failing within the rating process. Careful monitoring of suspended records with a view to correcting the data responsible for the failure will be maintained by the Rating Assurance function with Revenue Assurance.

3.5.11. Reference Data Management

Reference data held within the rating engine must be cross referenced with the data owners. Pricing and marketing initiatives which require additions of reference data or amendments to data such as rate, tariff plan etc will require stringent processes for uploading TCR's or price changes.

Ongoing audits of the system will be carried out by the data harmonization function with revenue assurance however a preventative as opposed to detection is fundamental to sustaining an accurate and efficient rating system.

3.5.12. Billing Process

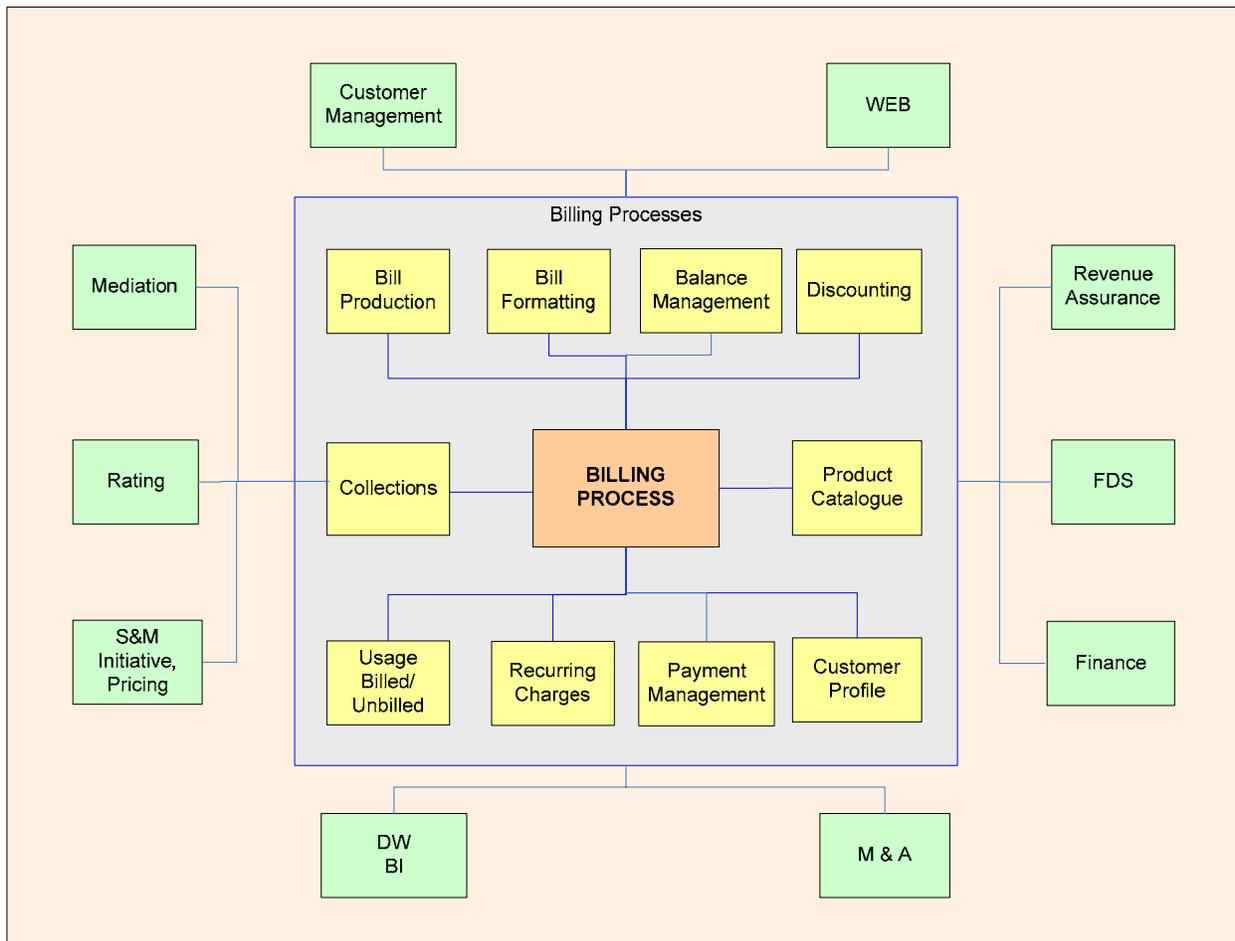


Figure 3.20. Billing Process High Level Architecture

The high level objectives of the billing system are:

- To create all charges and credits on a regular basis (to be defined by the business i.e. monthly, quarterly etc)
- To produce bills accurately, rapidly and on time

3.5.13. Bill Production

The core module within the billing system is the bill production process. Bill production seeks to calculate, create and collect all charges and fees for billed accounts to obtain the new updated account balance. This consists typically of CDR/EDR charges, recurring charges such as MRC's and ad hoc charges and credits or OCC's.

3.5.14. Bill formatting

The key components within the bill formatting module are as follows

- Interfaces with image/archiving system
- Bill pagination
- Forwards data to A/R and CM
- QA and bill sampling

The output should support the following formats:

- Paper bills – Including
- E-Bill
- SMS
- Web

3.5.15. Discounting

Discounting formats will be defined by the business and will associate to specific products and services and can be purchased as such.

In addition to standard product & service discounting there will be other forms of discounting which can be unrelated to the product and services available in the product catalogue. For example loyalty discounting schemes which discounting is carried out at predefined rate levels, increased over length of service or amount of airtime/volume of data used by the customer.

3.5.16. Collections

The collection policy as defined by the business will be a set of rules that defines when an account is unpaid and overdue. Coupled with these rules will be predefined sequence of events and activities which are required to be taken against the customer. The management of the collections process will be maintained with the Customer Management system and the sequence of events will be controlled within the billing systems itself.

The main features of the collections systems are as follows:

- Letter generation
- Production of collection messages on the customer's bill
- Referral of the overdue account to collection teams for manual handling
- Payment arrangement and follow-up process
- Suspension and cancellation of services
- Automated and manual referral to a collection agency
- Reporting on above activities and results

3.5.17. Customer Profile

The customer profile will be master for customer services, features and products. Billing will use Customer profile for all bill generation purposes.

3.5.18. Recurring Charges

Recurring charges can be on monthly, quarterly, yearly etc. Billing will use recurring charges to generate bills for a customer based on the configuration.

3.5.19. Usage Processing

CDR's and EDR's are rated based on the rate plan by the billing system on a timed basis. This process will populate unbilled tables. Bill generation process will extract data from these tables to generate bills.

3.5.20. Sub-Ledger (Transaction Ledger)

A sub or transaction ledger will be a part of the billing system and contain all financial transactions made during any given period. All billed transactions are they charges, debits credits or payments will be populated within the sub-ledger where the assignment of a ledger transaction code is applied. It is this ledger code which will be used to map all financial transactions to the external General Ledger, the codes within the sub-ledger are configurable and can be grouped and mapped to the external GL codes in order to comply with Telecom companies existing accounting policies.

3.5.21. Balance Management

Balance management will control and manage subscriber balances; predominately associated with prepaid subs the balance management component will interact in real time with the Intelligent Network (IN) managing in real time voice usage charges and potentially metered broadband decrementing balances in real-time on an event-by-event basis.

3.5.22. Payment Management

The payment management process will handle cyclical and ad hoc bill payments. It will also handle additional charges and payments such as supplementary CPE charges and payments. The component itself will interface with a 3rd party gateway for authorization of payments and adjust subscriber balances accordingly.

3.5.23. Product Catalogue

The product catalogue application will provide capability to define products to support variety of business requirements stemming from market needs and products defined by the product management organization. Products may be Simple or complex; Orderable; Default (Base) products and Configurable products.

Product definition may be based on factors such as Customer Channel, Line quality, Geography, Agent, SP, Payment preference and other factors.

There will be the capability to expose these products to order entry channels – CM, Web, and Retail partners.

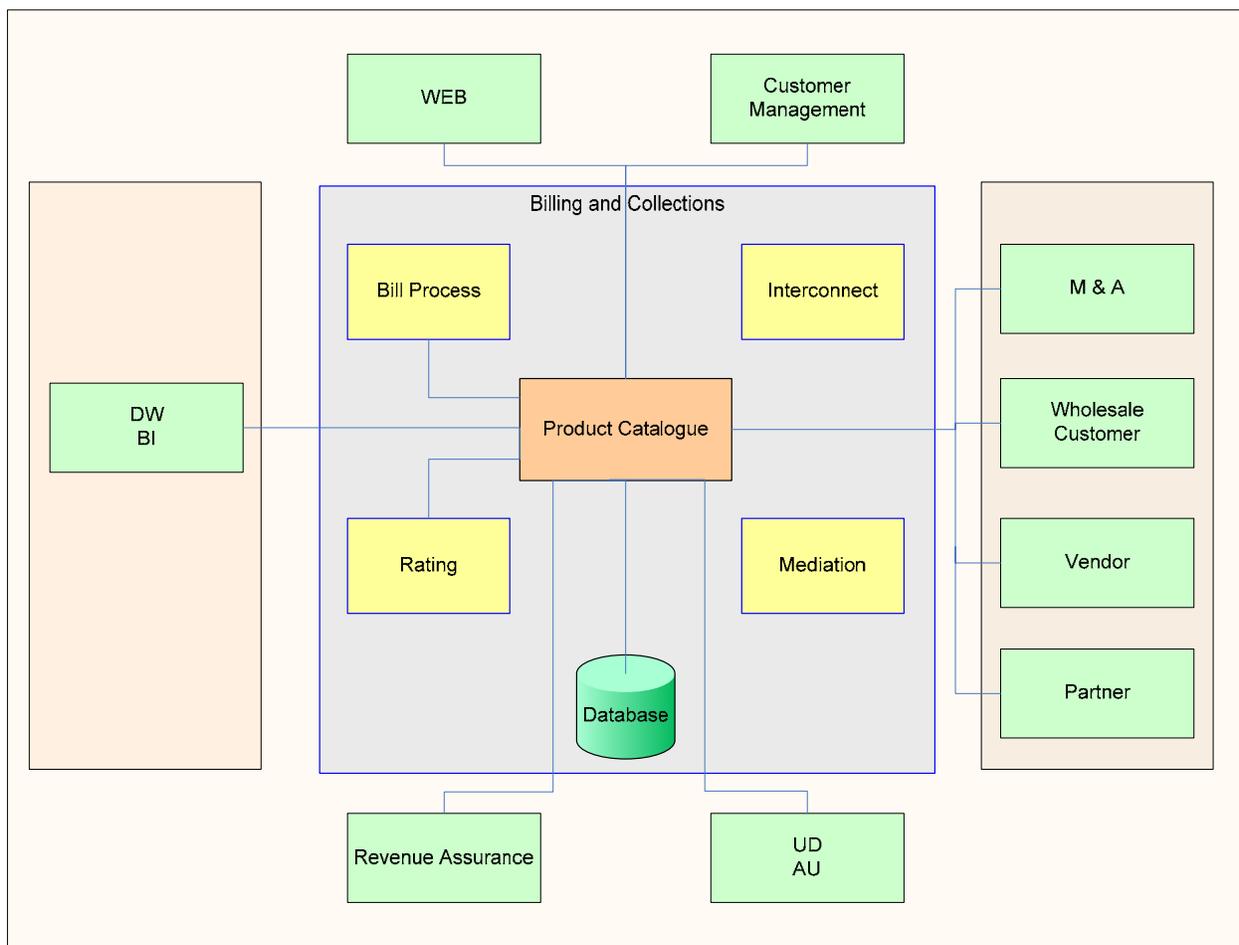


Figure 3.21. Product Catalogue High Level Architecture

The product catalogue will provide a view into Operators products including

- Pricing – definition of pricing rules, Price list management for discount and promotional pricing
- Feature description

- Validation of product bundles at the time of order entry
 - Compatibility
 - Availability
- Discounting
- Bundling

The following diagram gives a pictorial view of the above.

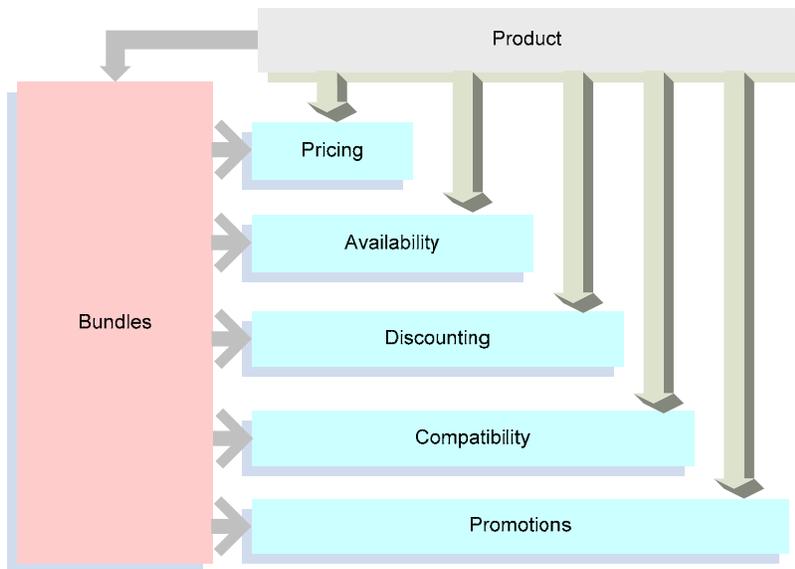


Figure 3.22. Product Attributes

3.6. Billing and Rating Systems

The product catalogue will interface with the Billing and Rating systems to provide correlation between product codes and billing codes for appropriate charging for recurring and non recurring charges

3.6.1. CM and PIM (Web)

The product catalogue will interface with the CM and PIM (Web) systems in order to propagate catalogue information to those customer and CSR-facing systems

3.6.2. Pricing Rules Engine

A pricing rules engine will be a part of product catalogue to create and associate price lists to billable products and bundles. Elements of this rules engine will be configurable through the customer management application but be enforced by the billing system.

The pricing engine will provide the system administrators to define various pricing policies and discounting rules, based on products, accounts, markets and other configurable parameters.

3.6.3. Interconnect

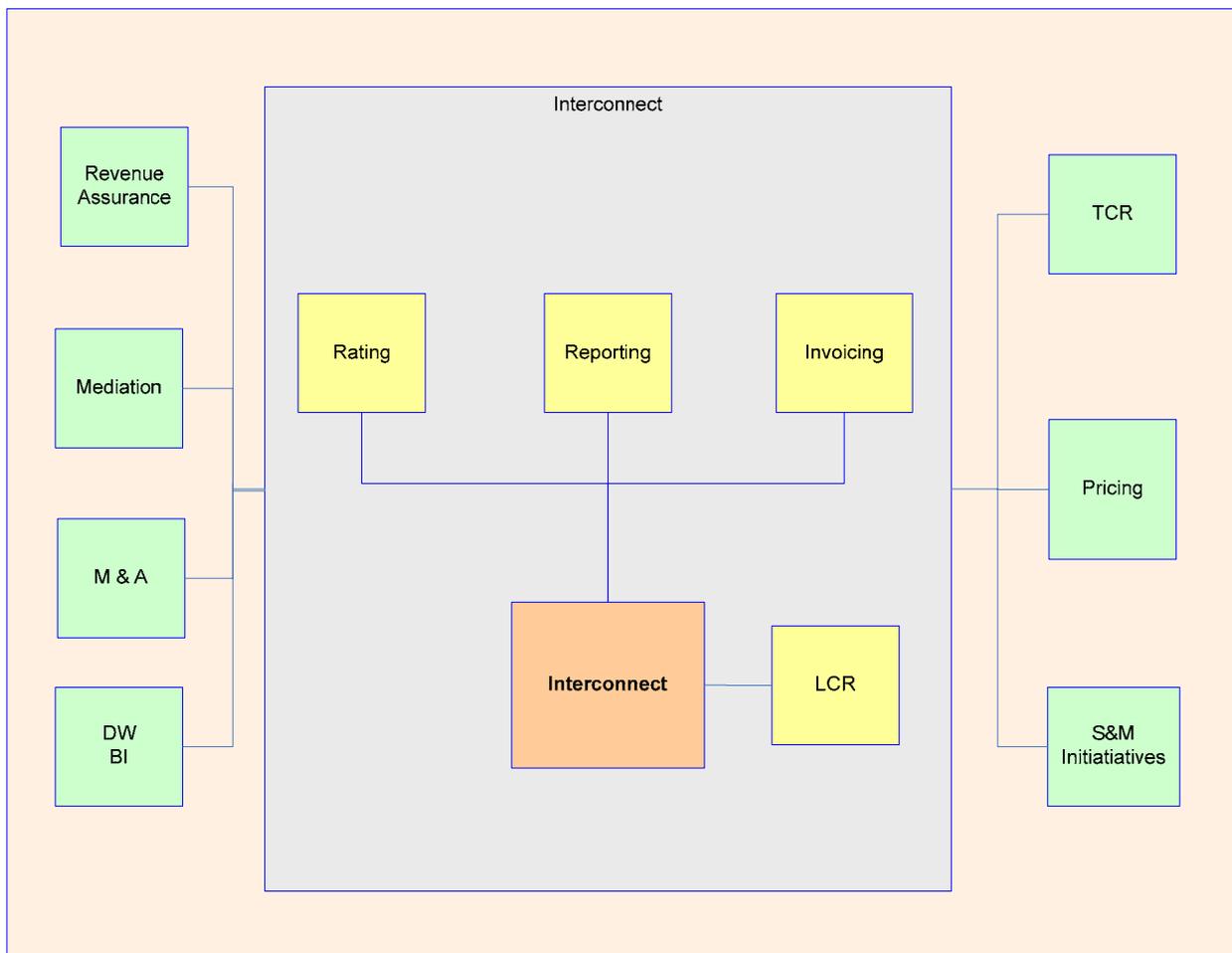


Figure 3.23. Interconnect High Level Architecture

3.6.4. Rating

Interconnect rating is typically more complex in terms of reference data and rules based tariff charges than retail rating.

The maintenance of destination groups and associated rates on a carrier by carrier basis will mean regular and complex maintenance of reference data within the rating engine.

Rating of interconnect related records should support the following reference data:

- Charge periods and national holidays
- Inbound, Outbound & Transit
- NNG & destination grouping
- Configurable rating by period e.g. per minute or per second rating
- Configurable rating by bearer e.g. Kilobyte/pulse
- Rounding
- Time band rating
- Zoneband rating e.g. National, Local, mobile, premium etc
- Rating on a carrier by carrier basis

Rating will also fully support verification and validation of all loaded files, failures can be managed through analysis, identification of the reason for error through root cause analysis, rectification of the error and finally re-processing of the suspended records.

Re-rating should also be a function within the interconnect platform, the ability to re-rate historic data prior to the implementation of amended interconnect agreements for testing & forecasting purposes.

3.6.5. Invoicing

Within the Interconnect settlement system the ability to reconcile usage records to network data is critical to management of inbound revenues and outbound costs.

All retail network usage where an interconnect with an operator has taken place should map directly to an Interconnect record.

The Interconnect platform will rate usage from the mediation system and be processed. Processing will assign usage records to individual carriers by cost band and then consolidate into invoices.

3.6.6. Least Cost Routing

The LCR module is the most complex area of Interconnect management. Much of this area is managed through detailed reporting available from the network, focusing on Operator trending, switch and route trending analysis. At the highest level LCR will seek to determine an optimal routing plan across the whole network using network measurements to drive the implementation plan.

Within the Interconnect management system a number of key components exist and it's these that will manage, trend and report on specified areas. The typical functionality within the system itself is,

- Basic LCR or advanced optimal routing driven by user defined parameters.
- Automated interaction with the network in order to carry out the build of complex routing structures.
- Mapping to the network switches in order to program routing commands for management of optimal routing programs
- CDR analysis to establish carrier quality and to drive optimal routing programs
- Analytics surrounding billed data in order to measure KPI's and associated products and services.

3.7. Reporting

As interconnect is a complex environment to manage and continues to grow over time, accessibility to KPI and static data are essential.

Reporting within the system itself should have the functionality to handle the following:

- Billing/invoicing of interconnect partners
- Interconnect bill validation through reconciliation of inbound and out bound invoices to forecasts
- Cost & Revenue reporting by partner, carrier, route and NNG
- Detailed analysis; CDR analysis through query GUI
- LCR and optimal routing analysis
- Suspense and erroneous file/record analysis
- GUI/reporting on reference data on a carrier defined basis
- Summary reporting on file/CDR status

3.8. *Fraud and Revenue Assurance*

For more information on the requirements related to this section, please refer to Section 7 - Billing and Collection in the Strategic Platform – Business Requirements document.

3.8.1. **Fraud**

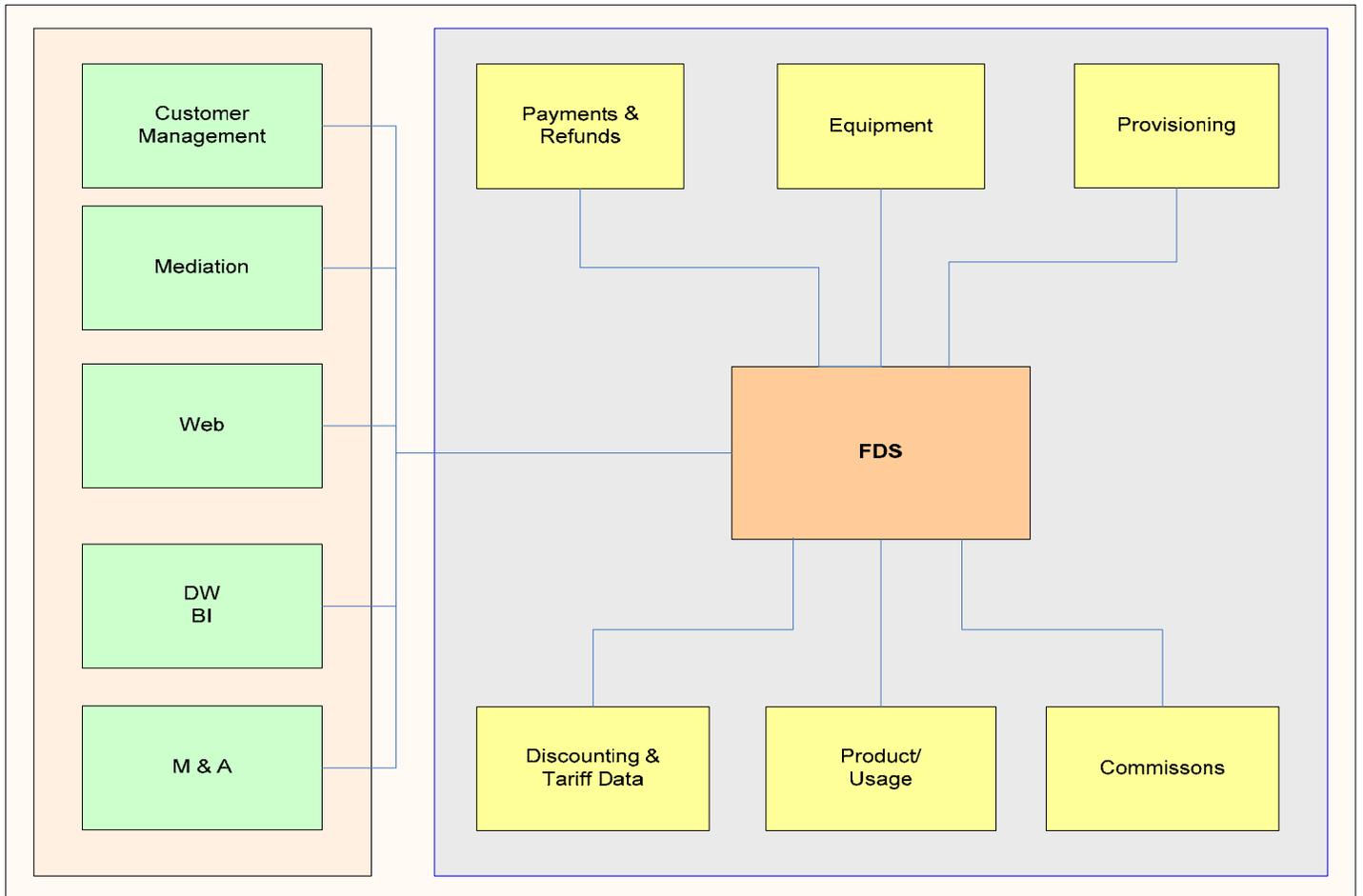


Figure 3.24. Fraud Detection System High Level Architecture

The FDS processes are in place in order to monitor potential fraudulent activity both internal and external to the business.

The fraud process should seek to proactively deploy a number of countermeasures across the business by applying the following methodical approach:

- Prevention
- Detection
- Response
- Recovery

Key areas of the FDS will focus on credit card fraud for ongoing and ad hoc payments detected through interfacing with CM and credit control systems monitoring payment activity on an account by account basis. Payment activities will include the monitoring of direct debits, cheque & cash payments and BACS.

Equipment ordering and provisioning will be closely monitored in order to measure activity against both internal and external users illegally accessing systems to self provisioning services or order equipment.

Discounting should be monitored from both an internal and external viewpoint; measurement of activities within systems will seek to highlight illegal changes to rating, discounting and charging rules.

Commissions will be a further cause for concern, measuring the authenticity of generated accounts to ensure bogus account creation is captured.

Credit rating processes and returns should also be closely monitored; verification of returned credit ratings should be monitored against potential user overrides, which may have arisen in order to generate sales.

Telecoms fraud through the monitoring of network usage, trending call scenarios e.g. on net/off net, national, international, mobile and premium rate. Analysis and trending of terminating destination number groups to highlight potential problem areas such as the artificial inflation of traffic carried out to defraud telecoms operators.

In addition to voice analysis broadband usage will be monitored; trending of network usage, trending dial up/usage scenarios to highlight potential problem areas such as multiple usage with the same date/time stamp via the same IP address and extensive sessions e.g. sessions greater than 24 hrs.

3.9.Revenue Assurance

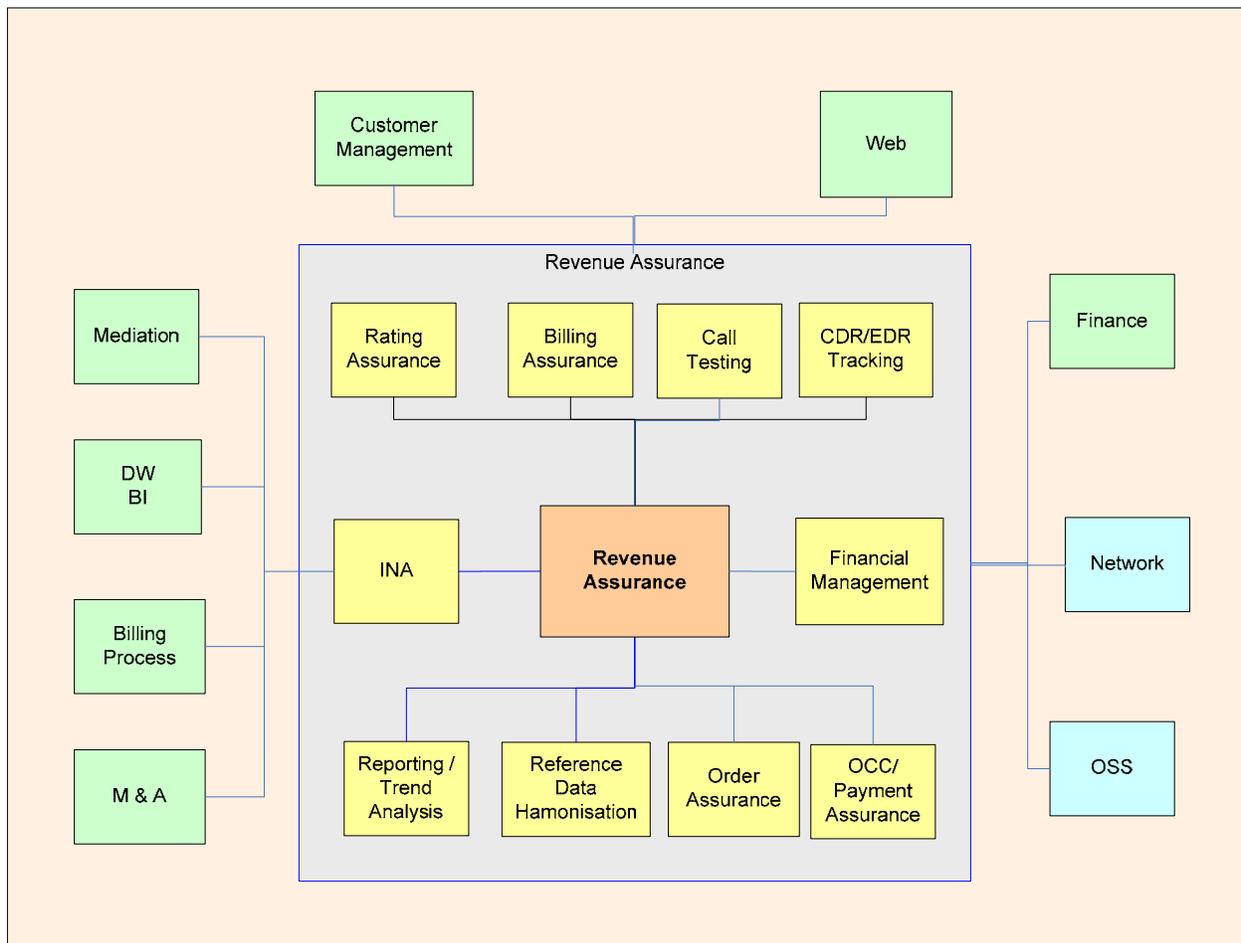


Figure 3.25. Revenue Assurance High Level Architecture

The Revenue Assurance function should seek to independently verify the integrity of all systems within the organizations architecture, the focus being on the systems involved in the revenue chain. The objective being that leakage is minimized for all revenue via all touch-points through all systems in order to ensure that all charges are complete and accurate and the all revenue is accrued.

There are a number of standard practices within RA, which need to be employed in order to maintain the following controls;

- Minimized revenue loss
- Maximized recovery
- Measure of completeness
- Regulatory compliance

A “self policing” tactic is an approach which is continually adopted by many businesses worldwide, where functional owners are responsible for their link in the revenue chain. In employing this kind of approach, the integrity of revenue is placed at high risk, as operational performance is usually priority No.1 within functional groups.

In many organizations, an internal audit function is employed in order to gain independence over operational and functional performance. An audit based approach in many circumstances is unlikely to have the detailed depth of understanding required in order to maintain exhaustive and affective control and will find itself too detached from the mechanics involved in the revenue chain.

In taking all this onboard a successful Revenue Assurance outfit must be not only an independent function but also be technically & commercially engaged within all areas of the organization where revenue is impacted.

Within the RA architecture the following functions should be managed

- Rating Assurance
- Billing Assurance
- Traffic Assurance
- OCC/Payment Assurance
- Order Assurance
- Reference Data Harmonization
- Reporting
- Financial – Transactions from source are all posted to the General Ledger

The aimed structure should seek to include a mixture of both operational and control functions which when combined will meet a ‘Detection and Prevention Assurance’ methodology essential to a successful Revenue Assurance function.

3.10. Billing Assurance

Billing Assurance as with Rating Assurance is a core function within the RA function. The primary aim of BA is to ensure the accuracy of the billing system and more specifically the accuracy of charges, credits and eligibility of discounts applied to accounts. Monitoring of errors and or suspended records within the billing system should be closely monitored and managed.

Verification of rounding rules and level of rating and pro-ration activity will also be monitored and impact in revenue loss will be assessed.

3.11. Financial

Assurance of all financial transactions relating to revenue is mapped correctly to GL account codes.

Ensuring that all billed revenues, payments and charges are accurately mapped and recognized with the Ledger. A Touch point reconciliation process should be carried out on a regular basis determined by the business.

The following information is critical to finance for their reconciliation:

- Unique customer id (i.e. account number)
- Unique payment transaction id (i.e. date/time stamp)
- Unique transaction reference (source system.; charge type – i.e. CPE/connection fee/recurring charge)
- Actual charge type and value
- Actual payment method and value
- Allocation detail (payments and credits)
- Credit value and type
- Ongoing payment method
- Circuit ID (i.e IP Stream, Data Stream, LLU)

3.12. OSS

OSS represents the various functions of telecom from a network perspective.

The OSS components will monitor and control:

- Inventory
- Network performance
- Network traffic
- Network faults
- Network associated Trouble Tickets
- SLA Management
- Network Authentication

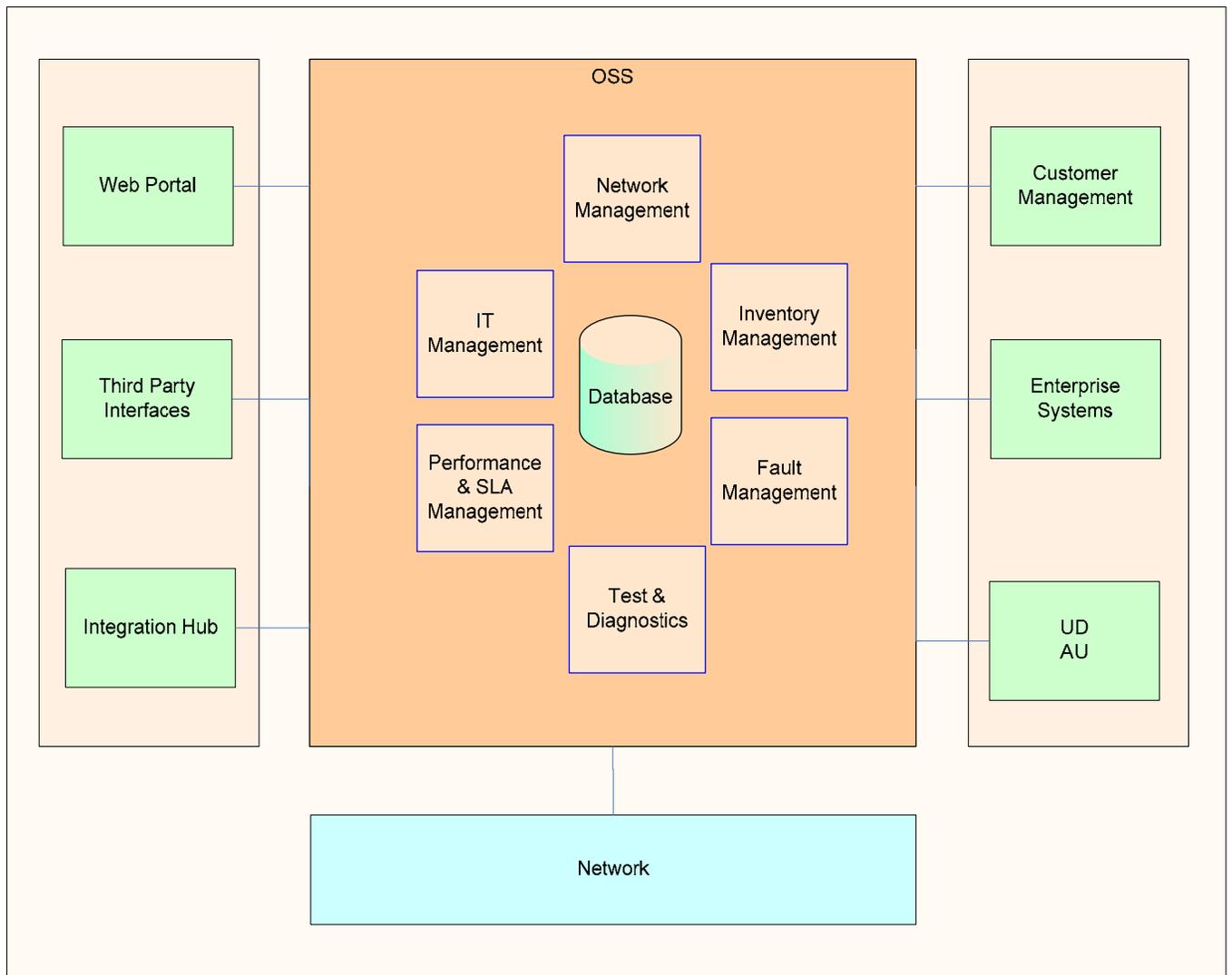


Figure 3.26. OSS High Level Architecture

Modules of Operations Support System

- Network Management
- Authentication Authorization Accounting
- Performance and SLA Management
- Fault Management
- Inventory Management

For more information on the requirements related to this section, please refer to Section 9 - OSS and Network Operations in the OLO Strategic Platform – Business Requirements document.

3.12.1. Network Management

In the context of this document, Network Management includes the management of the OLO Telecommunications network that is used to deliver services to its customers.

Network Management Component is responsible for managing the network, which includes

- Network traffic
- Network configuration
- Fault diagnosis and correction

A crucial component of Network Management is the Network Operation Centre (NOC), which is a location from which the operation of a network is monitored. Additionally, this centre usually serves as a clearing house for connectivity problems and efforts to resolve those problems.

The NOC collects alarms from different layers of the network (Network Elements, Element Management) and is responsible for filtering the fault alarms received.

The network management component will interact with other components inside and outside the OSS domain. The Integration hub will be used as a communication bridge if a component from OSS wants to interact with a component outside of the OSS domain.

The Network Management component is responsible for updating network and service outage status on the Integration hub via periodic updates.

Network management will further send the filtered alarms to the fault management component.

The Network Management component will interact with the Performance and SLA component to fetch configuration data for SLA management. SLA information will be stored in the OSS database for future use.

Due to the evolving nature of technology and the network (IT and Telecom), it is envisaged that the Network Management component will need to synchronise with the IT Management application.

3.12.2. Performance and SLA Management

Performance and SLA management component will be responsible for two functionalities-

- Performance monitoring of the telecom companies network
- SLA management as committed to Wholesale customers, Business customers and Corporate (Enterprise) customers

Performance Management systems are responsible for measuring, analyzing and controlling the performance of various network components, including network throughput and error rates. If the number of customers increase and the capacity of the access, switching and transport networks remains the same, this will result in performance degradation.

The network performance data can be used in planning, forecast, design, and build activities. Certain triggers can be configured to generate notification if performance degrades. Historical analysis of performance data can also be done through reporting mechanisms on a periodic basis. Performance data can be used for capacity analysis and planning.

Service Level Agreement (SLA) Management and monitoring systems allow telecom companies Wholesale Customers, and Business and Corporate customers to measure the performance of the network, and to provide verification that the network is performing according to the agreed service level guaranteed by telecom in case of broadband operations.

SLAs offer guarantees of network availability and performance and have become an important sales tool to attract customers away from competitors. SLAs establish a set of parameters that may include minutes of downtime per month, delay during peak usage periods, and other parameters. The SLA management component is responsible for configuration of SLA data and stores the performance data if performance goes below configured values.

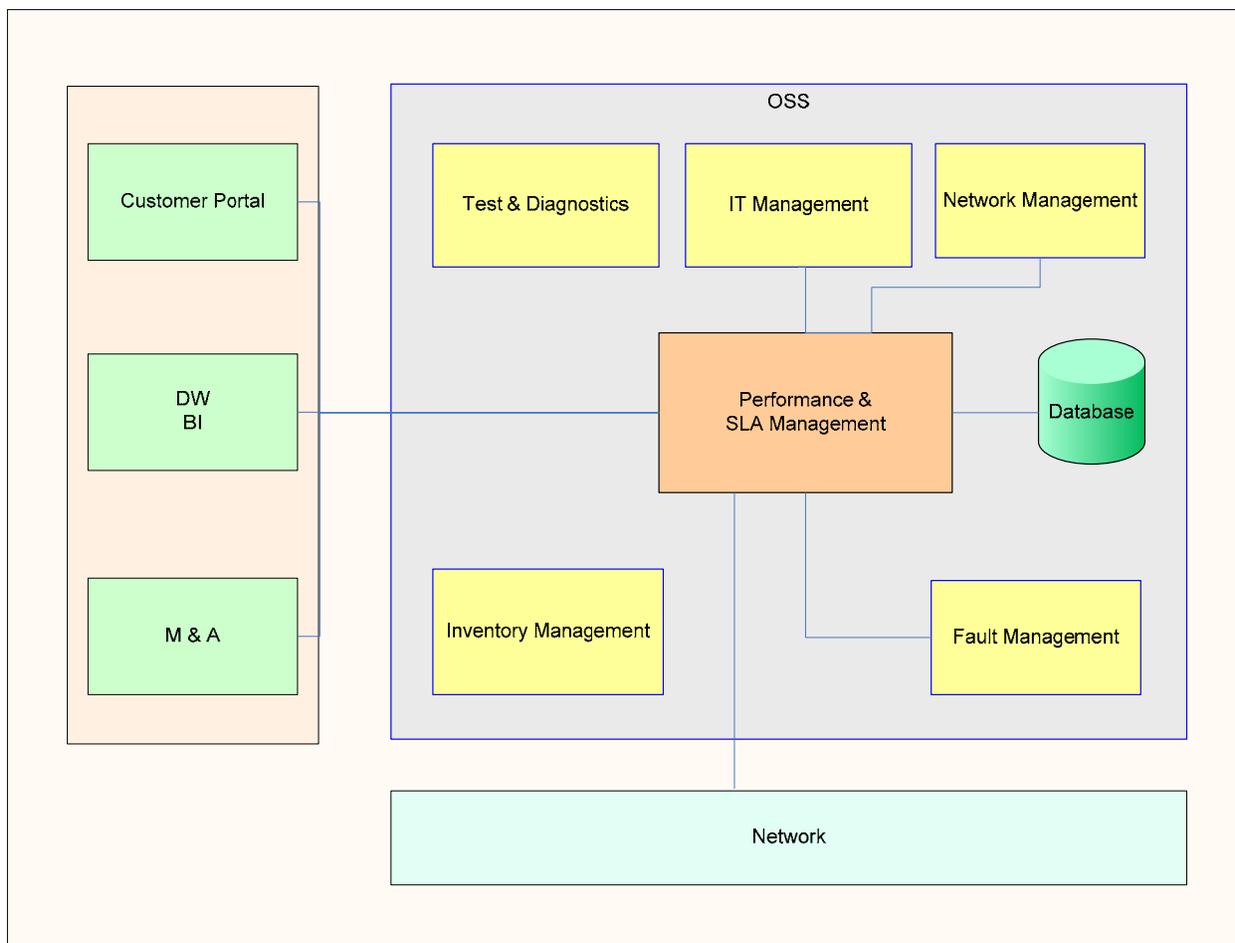


Figure 3.27. Performance and SLA Management High Level Architecture

The Performance and SLA management component interacts with the Customer Portal component to provide SLA statistics to customers.

The SLA management component will communicate to the Network management and Fault management component to fetch data about network faults, network outages and network performance data.

3.12.3. Fault Management

Fault management is the process of creating Network Trouble Tickets based on alarms received at the Network Management component. This could include

- Creation of Network Trouble Tickets
- Tracking of Network Trouble Tickets
- Workforce job assignments (Discovering the existence of the problem, Identifying the source)
- Resolution of Network Trouble Tickets (Repair)
- Closure of Network Trouble Tickets

3.12.4. Inventory Management

The Inventory Management component deals with the management and administration of the telecom companies resource inventory. This component ensures that resources in the inventory database are synchronized with the actual installed resource base.

This can be achieved by means of,

1. Auto-discovery mechanisms of new hardware introduced anywhere in the network
2. Updates by Order Management/Provisioning systems upon allocation or deal location of equipment to specific subscribers
3. Manual audits
4. Inventory regained via Data Cleanse mechanisms for legacy data in the inventory system

Inventory management stores end-to-end connection data for network elements (interconnection between network elements). Inventory management component is responsible for number and IP pool data. It is also responsible to manage physical as well as logical inventory of the enterprise.

Inventory management may be composed of different aspects such as:

- Logical inventory
 - Phone numbers
 - IP addresses
 - Circuits
 - Channels
 - Virtual paths
 - Virtual containers, etc.

- Physical inventory
 - Plant equipment
 - Routers
 - Switches
 - Cables
 - Shelves
 - Racks
 - Ports, etc.

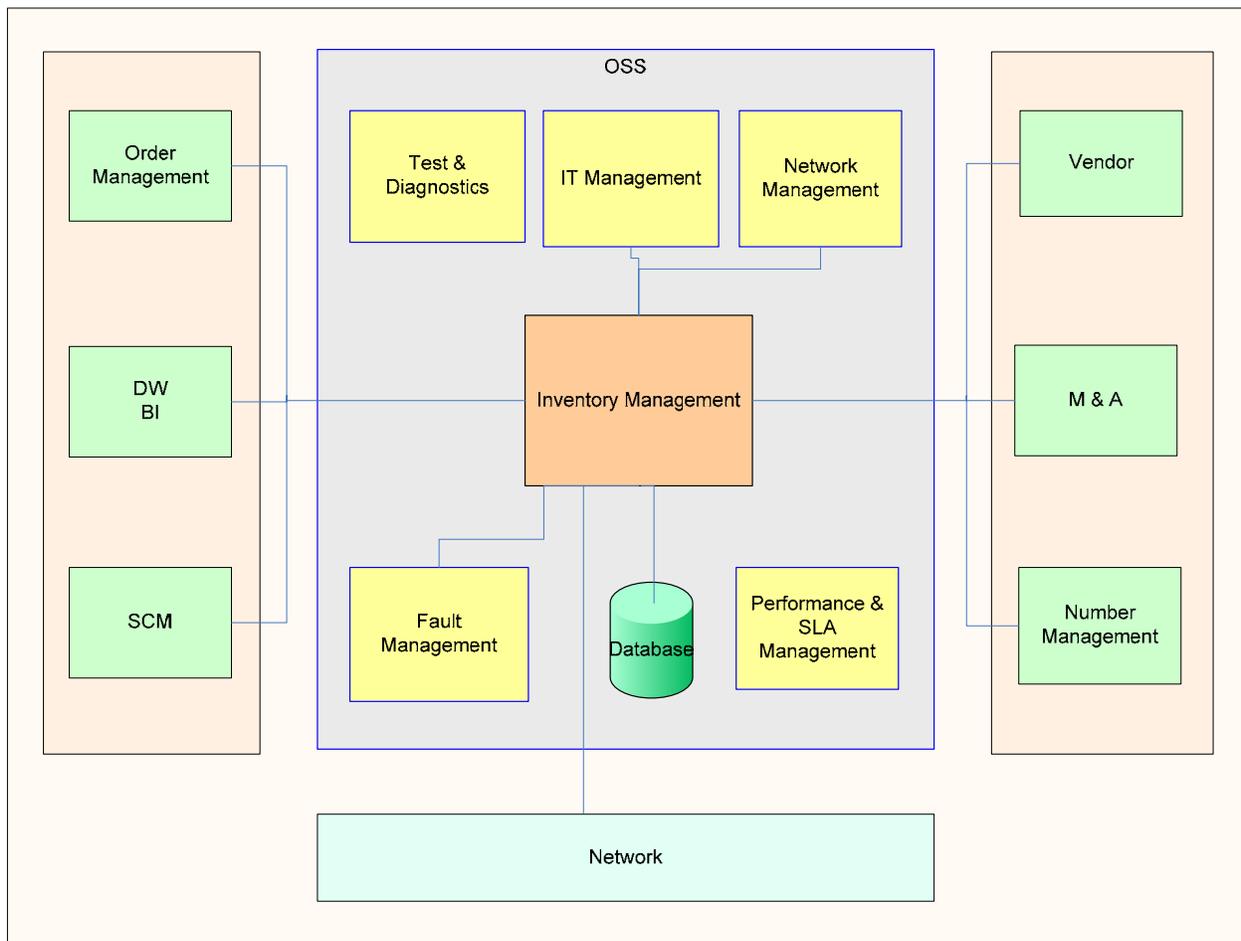


Figure 3.28. Fault Management High Level Architecture

The Inventory management component will interact with order management component. Whenever the user places a new order via any of the channels, the order management component will interact with the inventory management component for ascertaining that the inventory exists. The Inventory management component will communicate to the number and address management component. The Number management component is used to allocate telephone numbers to subscribers and the address management is used to request IP addresses from an IP pool.

3.13. The Billing process and flow

We will describe the work flow and describe the billing system process flow and explaining the relation between the departments. Figure 3.29 shows the main categories in the billing process and flows.

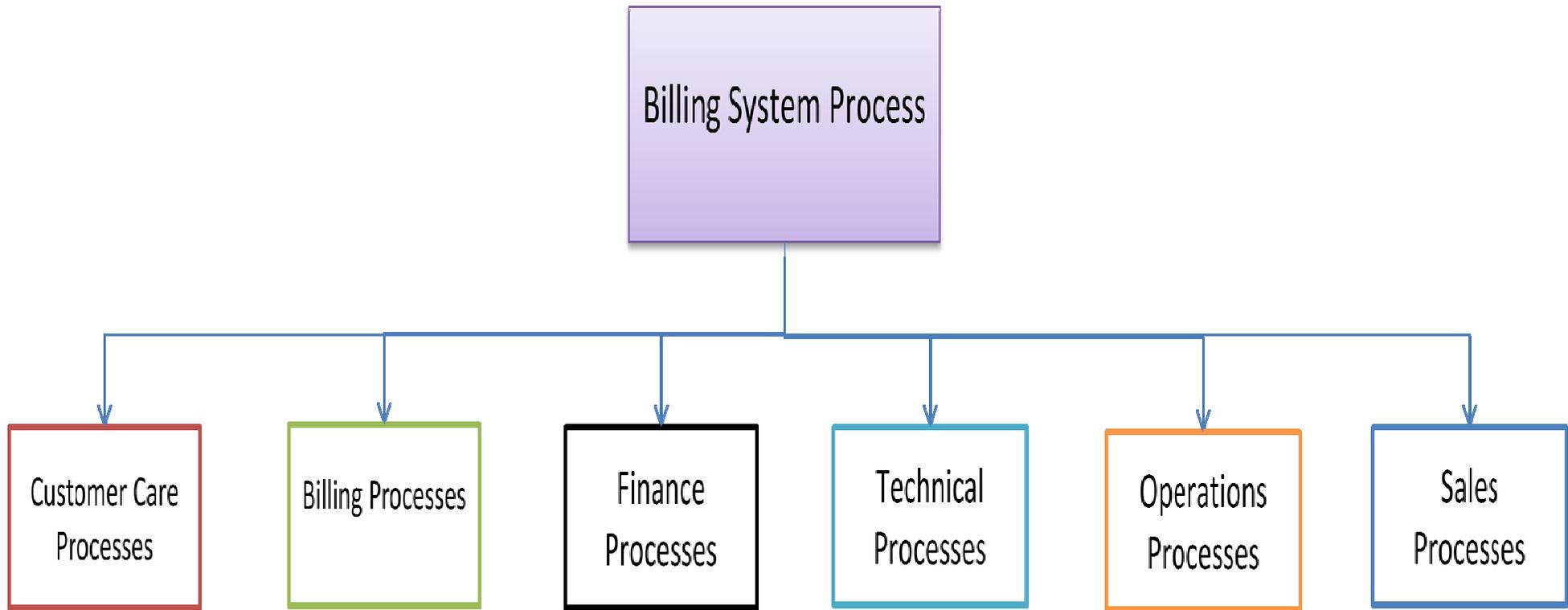


Figure 3.29. Billing process and flow

For a full detailed process please refer to figure figure 3.30 .

3.13.1. Customer Care Processes

The following process describe the customer care process and there map flows.

3.13.1.1. Alert Generation Process

This process covers all operations required to generate Alerts and notifications in case of any customer request or any notification alert, figure 3.29 will describe the process map.

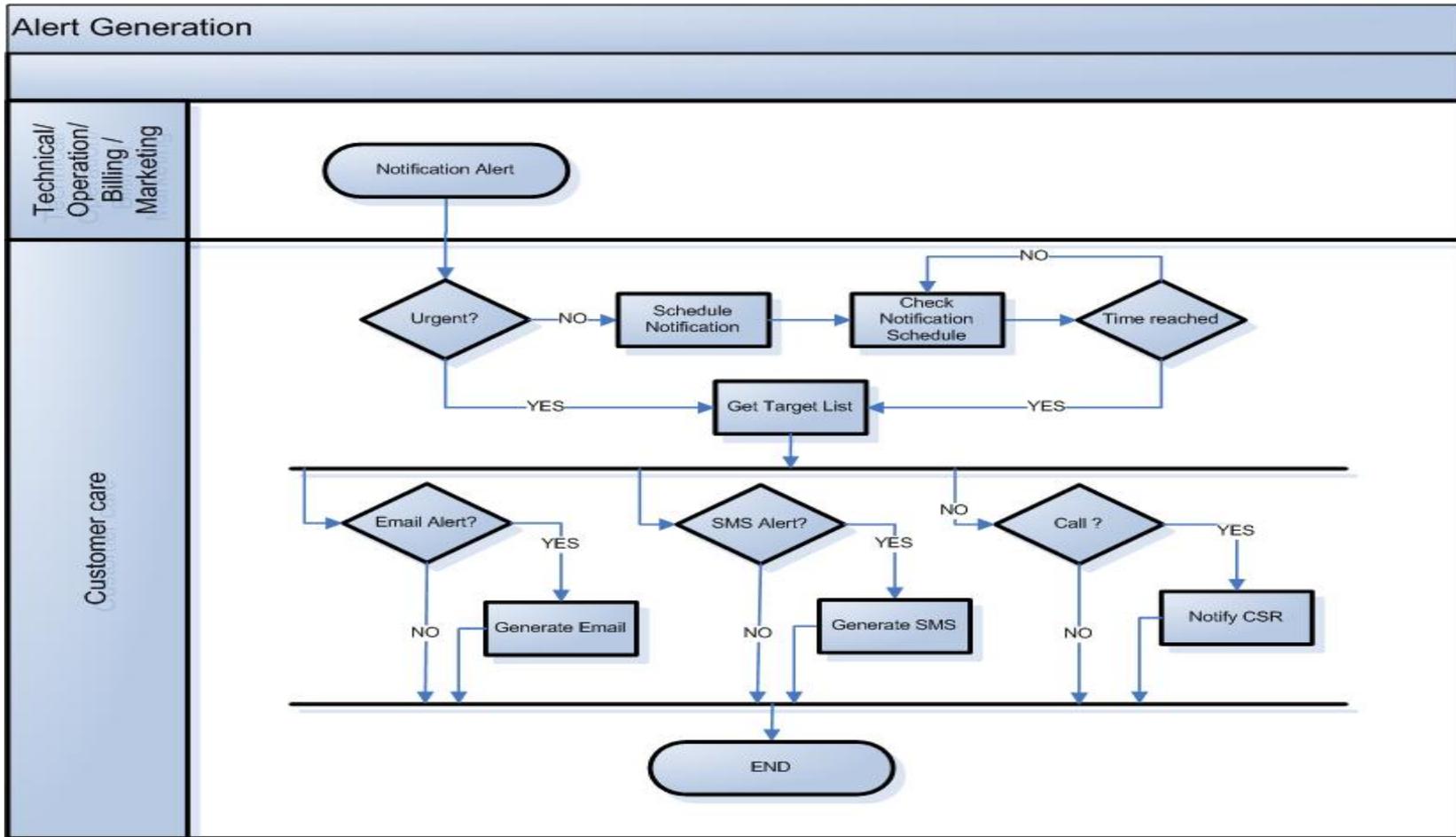


Figure 3.31. Alert Generation Process

Process Elements

Process Owner	Customer Care Department
Process Input	Alert information
Process Output	Alert Generated
Stakeholders	1. Customer Care Department
KPI's / Efficiency	

Process Detailed Description

	What	Description	Who	Form	When	Note
1.	Notification Alert	Alert request is received from any department		Alert Generation Form		Any department can request an alert for any activity which can effect customer service
2.	Decision Point 1: If it is not an urgent notification then proceed to Point 3 otherwise proceed to Point 6					
3.	Schedule Notification	Schedule alert to be generated at the specified Time			After confirming alert as non urgent	
4.	Check Notification schedule	Check Notification scheduled for current time				
5.	Decision Point 2: If scheduled alert time is reached then go to point 6 else go back to Point 4					
6.	Get Target List	Get List of addresses to be notified			After the Alert time is reached	
7.	Decision Point 3: If email alert is to be generated then go to point 8					
8.	Generate Email	Send email to the listed email addresses			after receiving target list	
9.	Decision Point 4: If SMS alert is to be generated then go to point 10					
10	Generate SMS alert	Send SMS to the listed email addresses			after receiving target list	
11	Decision Point 5: If call alert is to be generated then go to point 12					
12	Notify CSR	Notify customer support representative to call			after receiving target list	

3.13.1.2. Self Service Process

Process Scope

This process covers all operations required to provide self service support to the customer, the process map is shown in figure 3.32

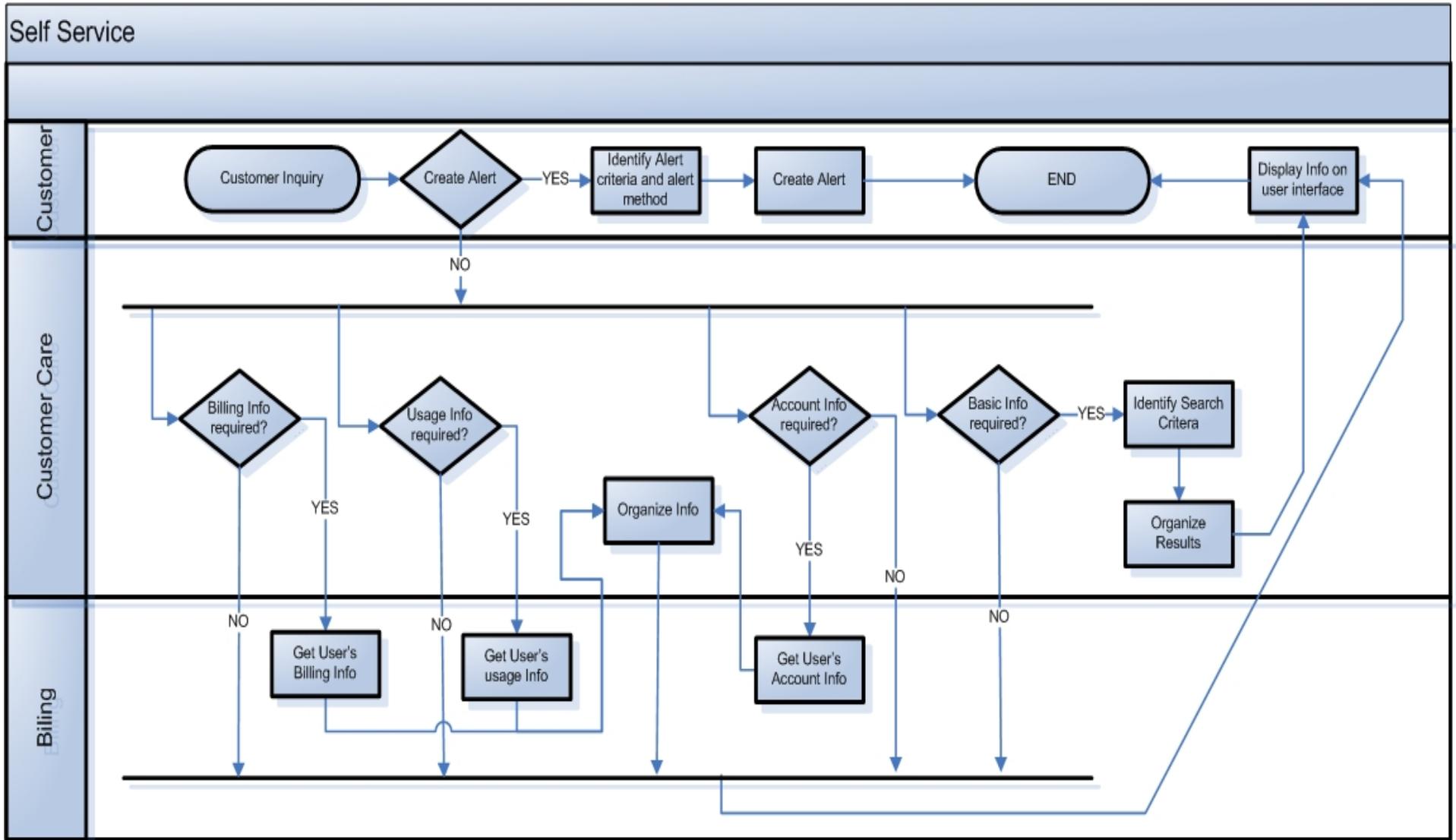


Figure 3.32. Self Service Process

Process Elements

Process Owner	Customer Care Department
Process Input	Customer inquiry
Process Output	Information delivered to customer
Stakeholders	Customer Care Department Billing
KPI's / Efficiency	Customer Inquiry to information delivery Time

Process Detailed Description

What	Description	Who	Form	When	Note
Customer Inquiry	Information inquiry request is received from customer				
Decision Point 1: If customer want to create alert then go to Point 3 else proceed to Point 5					
Identify Alert criteria and alert method	Customer fills form and Alert Criteria and alert Method		Alert Creation Form	When customer wants to create alert	
Create Alert	Customer creates Alert			After customer fills the form	Alert can be for any purpose e.g. when quota reaches 100MB
Decision Point 2: If customer requests Billing Information then go to Point 6					
Get Billing Information	User's Billing information is retrieved from Billing department			After billing information is requested	
Decision Point 3: If customer requests Usage Information then go to Point 8					

Get Usage Information	User's usage information is retrieved from Billing department			After usage information is requested	
Decision Point 4: If customer requests Account Information then go to Point 10					
Get Account Information	User's Account information is retrieved from Billing department			After Account information is requested	
Organize Information	Requested information is organized in a presentable form			After the requested information has been retrieved	
Decision Point 5: If customer requests Basic Information then go to Point 13					
Identify search criteria	Customer describes search criteria		Basic Information search form	After basic information is requested	
Organize Results	Basic search results are organized in a presentable form			After the basic information search results are retrieved	
Display Info on user Interface	Requested information is displayed on User Information			After requested information is organized is	

3.13.1.3. Trouble Ticket Process

This process covers all operations required to resolve customer problems and to generate Trouble Ticket, figure 3.33 shows the process map.

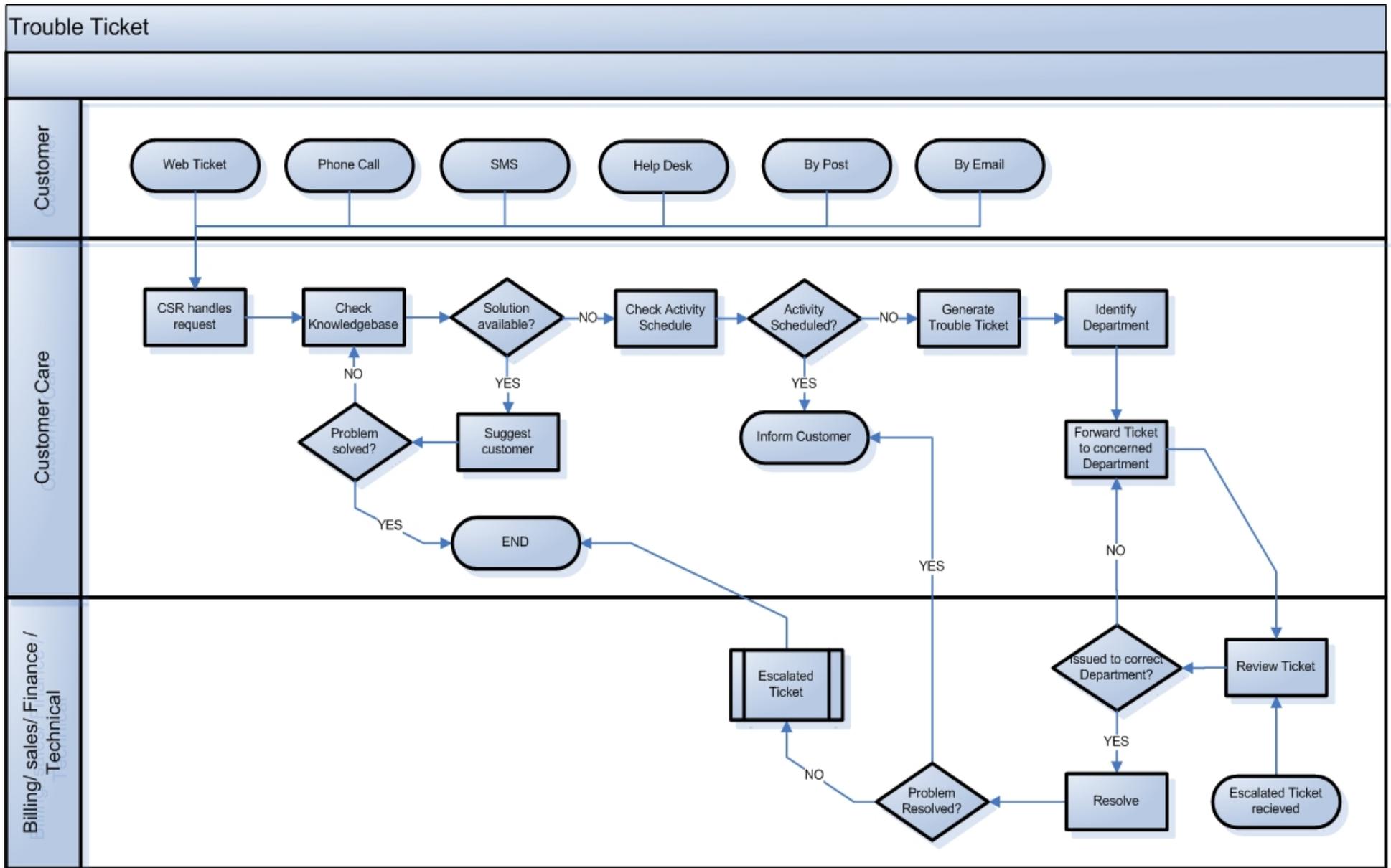


Figure 3.33. Trouble Ticket Process

Process Elements

Process Owner	Customer Care Department
Process Input	Customer problem
Process Output	Problem resolved
Stakeholders	Customer Care Department
KPI's / Efficiency	Customer problems to problems resolved ratio, Customer contact to problem resolution Time

Process Detailed Description

What	Description	Who	Form	When	Note
Customer contacts	Puts forward a problem via: web ticket, SMS, email, Post, calls CSR, visits Help Desk				
CSR handles request	CSR receives customer request and entertains customer	Customer Support Representative		After customer contacts	
Check knowledgebase	CSR searches solution for customer's problem in the knowledgebase	Customer Support Representative		After customer contacts	
Decision Point 1: If solution for the problem is found then go to Point 5 otherwise proceed to Point 7					
Suggest customer	CSR suggests the customer the solution found for the problem	Customer Support Representative		After a solution of the problem is found	
Decision Point 2: If problem is not solved then go back to the Point 3 otherwise end					
Check Activity schedule	Check the schedule and find out if there is any activity in progress	Customer Support Representative		When solution for the problem is not found	

Decision Point 3: if an activity is in progress then go to Point 16 otherwise proceed to Point 9						
Generate Trouble Ticket	Prepare a trouble ticket for this unsolved problem	Customer Support Representative	Trouble Ticket form	After no activity is found in progress		
Identify Department	Find out department, the problem is related to.	Customer Support Representative	Trouble Ticket form	When preparing Trouble Ticket		
Forward Ticket to the concerned department	Send trouble ticket to department, the problem is related to	Customer Support Representative		After the Trouble Ticket is prepared		
Review Ticket	Receiving department rechecks if the department is correct			After the ticket is received		
Decision Point 4: if Ticket issued to correct department then go to Point 14 otherwise go back to point 11						
Resolve Problem	A person in the concerned department tries to resolve the problem			After the ticket is verified		
Decision Point 5: If problem is solved then go to Point 16 otherwise proceed to Point 17						
Inform Customer	Inform the customer about the status of the problem	Customer Support Representative				
Escalated Ticket	Escalated Ticket sub process is executed			After the ticket is not resolved		
Escalated ticket received	Escalated ticket is received from Escalated Ticket sub process			When this process is called from Escalated Ticket sub process		

3.13.1.4. Escalation Process

This process covers all operations required for escalating trouble tickets; the process map is shown in figure 3.34

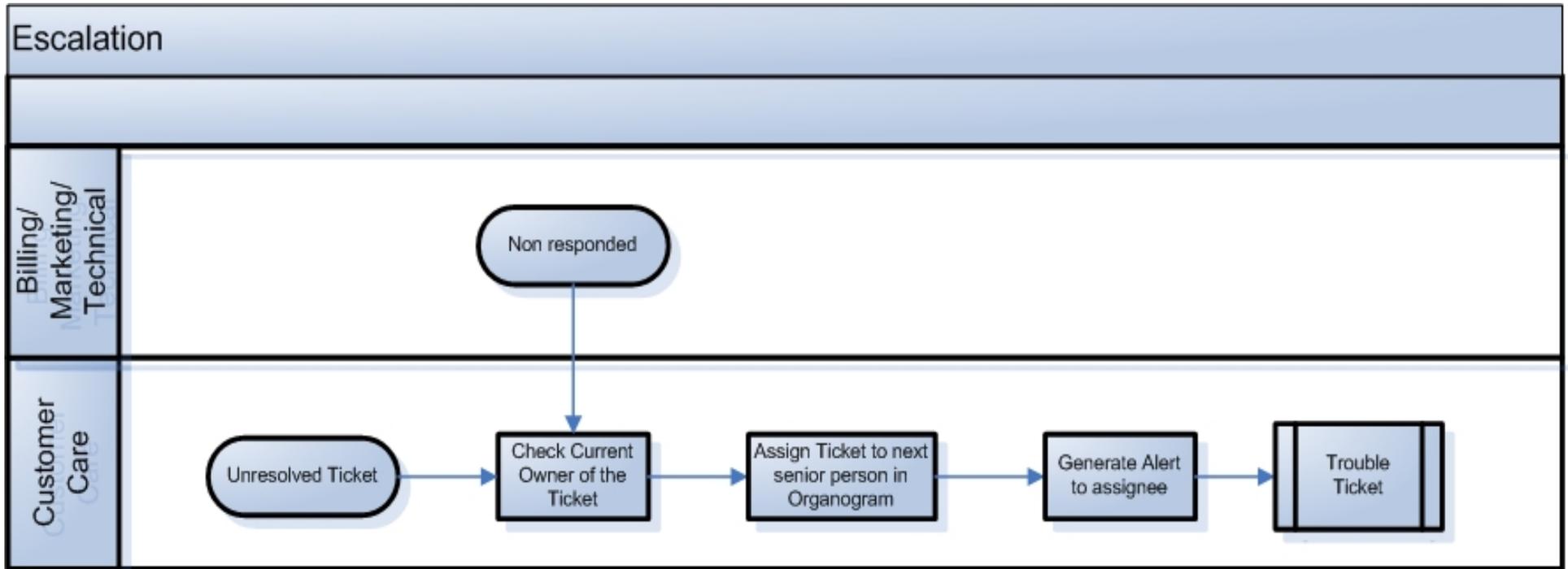


Figure 3.34. Escalation Process

Process Elements

Process Owner	Customer Care Department
Process Input	Unresolved Customer Problem
Process Output	Higher Authority Attention
Stakeholders	Customer Care Department, Sales/ Billing/ Technical
KPI's / Efficiency	

Process Detailed Description

What	Description	Who	Form	When	Note
Non responded Ticket	Non responded ticket is received				It is received when a ticket is not entertained for a specific time span. It can be from any department
Un resolved Ticket	Unresolved ticket is received				
Check current owner	Find out person , the ticket is currently assigned to			After the ticket is received for escalation	To see the level of authority in the organization
Assign Ticket to next senior person	Finds out next senior person from organization and Assign ticket to that person			After getting current owner of the ticket	To get the attention of a more senior person towards the unsolved problem
Generate Alert to the assignee	notifies person, the ticket is assigned to			After assigning to the next senior person	
Trouble Ticket	Trouble Ticket sub process is called			After the assignee is notified	

3.13.1.5. Service Termination Process

This process covers all the operations required to terminate service after receiving service termination request from customer

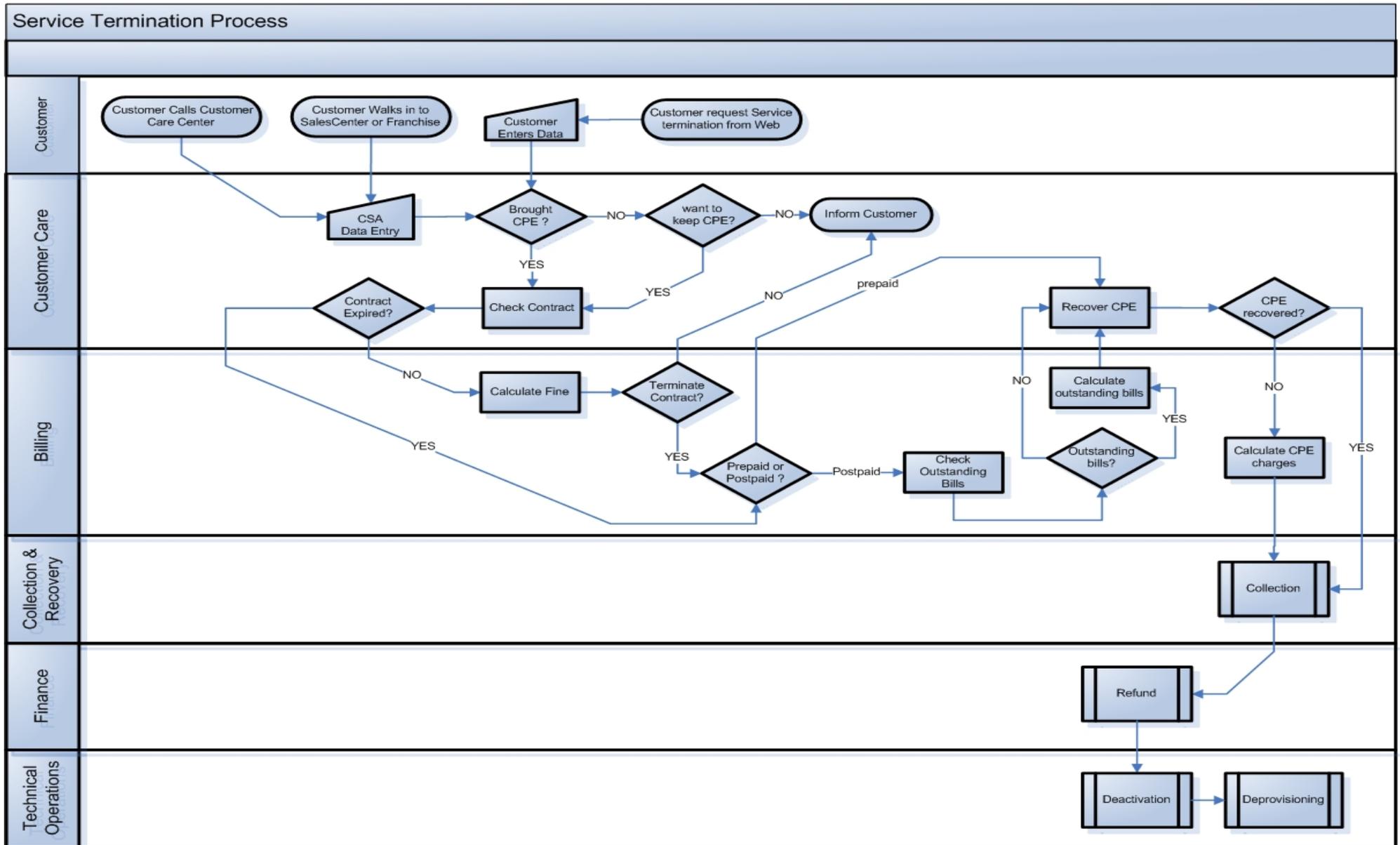


Figure 3.35. Service termination

Process Elements

Process Owner	Billing Department
Process Input	Customer Account Info
Process Output	Service & Account Terminated
KPI's / Efficiency	Termination request to outstanding bill collection Ratio, Termination request to Deactivation time

Process Detailed Description

	What	Description	Who	Form	When	Note
1.	Customer Request Service Termination	1.calls Customer Care Center 2.Visits Customer Care Center 3.Online	Customer			
2.	Data Entry	Account information is recorded	Customer/Customer Support Agent	Data Entry Form	After customer contacts us	In case customer calls or visits Customer Care Center Company Representative enters Account information. In case of Online, customer fills up form.
3.	Brought CPE	Check if Customer has brought CPE.	Customer Support Agent		After Account Information has been received	
4.	Decision Point 1: If customer has brought CPE then go to point 6 otherwise go to point 5					
5.	Decision Point 2: If customer wants to keep the CPE then move to point 6 else inform customer to return the CPE.					
6.	Check Contract	Check the customer for its expiry date & other obligations	Customer Support Agent		After resolving CPE returning issue	

7.	Decision Point 3: If contract Expired then go to point 10 otherwise go to point 8					
8.	Calculate Fine	Fine is calculated for terminating contract before its expiry			After validity of contract is confirmed	
Decision Point 4: If customer still wants to terminate contract then proceed to point 10 otherwise inform customer.						
Decision Point 5: if service billing package is postpaid then go to point 11. if it's a prepaid package then proceed to point 14						
	Check outstanding bills	check outstanding bills of customer			After confirming the package as postpaid	
Decision Point 6: If there are any outstanding bills then go to point 13 otherwise proceed to point 14						
	Calculate outstanding bills	Calculate outstanding bills of the customer			When some outstanding bills are confirmed	
	Recover CPE	Check working condition of CPE	Customer Support Agent		After resolving billing package issues	
Decision Point 7: If CPE is not in working condition then go to point 16 otherwise proceed to point 17						
	Calculate CPE charges	Calculate CPE charges			After CPE is not found in working condition	
	Collection	Collection Sub process is initiated			After resolving CPE recovering issue	
	Refund	Refund sub process is initiated			After collection sub process is completed	
	Deactivation	Deactivation sub process is initiated			Immediately after the contract termination is confirmed	
	De-provisioning	De-provisioning sub process is initiated			After the De activation sub process is completed	

3.13.2. Billing Processes

3.13.2.1. Invoicing/Bill Process

This process covers operations required to generate invoice according to customer's Invoicing Cycle.

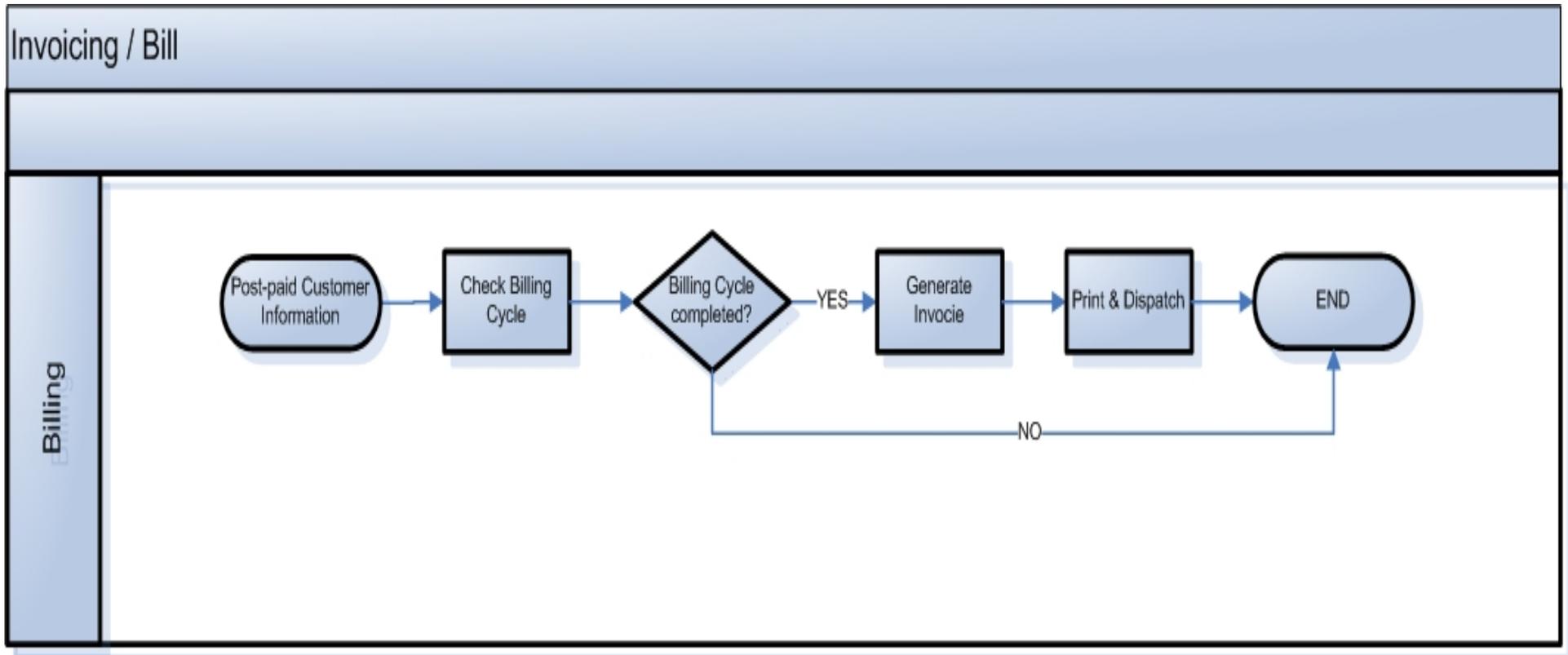


Figure 3.36. Invoice /Bill process

Process Elements

Process Owner	Billing Department
Process Input	Postpaid customer's invoicing information

Process Output	Invoice dispatched to customer
Stakeholders	Billing Department
KPI's / Efficiency	Invoice generation to invoice delivery time

Process Detailed Description

	What	Description	Who	Form	When	Note
1	Post paid customer's information	Invoicing Cycle Information for postpaid customer is collected as input				
2	Check Billing Cycle	Check if the current Billing cycle is completed			After the invoicing Information is collected	
3	Decision Point 1: If Billing cycle is completed then go to Point 4 otherwise end process					
4	Generate Invoice	Invoice is generated for completed billing cycle			When the billing cycle completes	
5	Print & Dispatch	Invoices are printed and dispatched to customer's address			After invoices are generated	

3.13.2.2. Collection Process

Process Scope

This process covers operations required to collect & recover service charges from customer

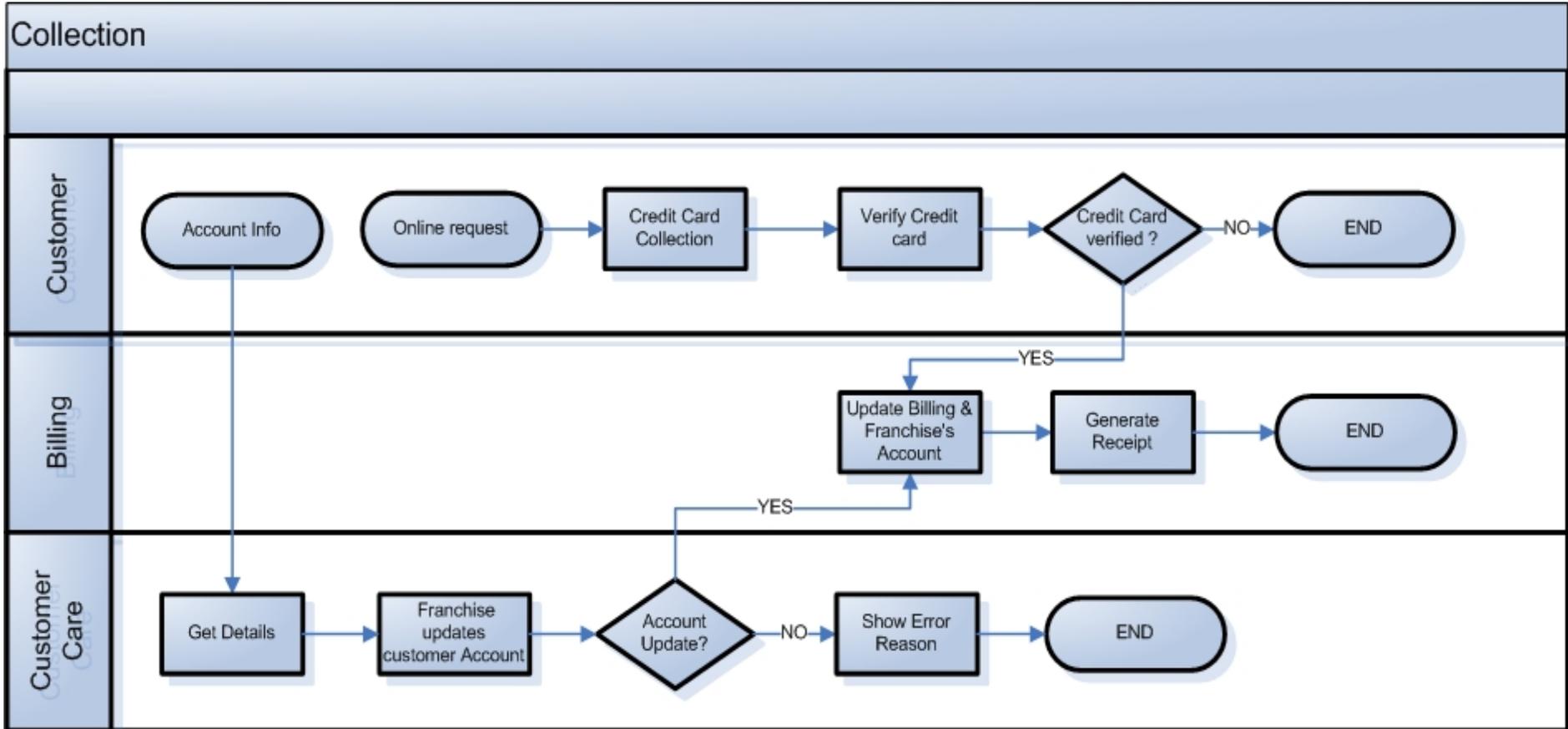


Figure 3.37. Billing and collection

Process Elements

Process Owner	Billing Department
Process Input	Customer Billing Info
Process Output	Dues collected
Stakeholders	Customer care Department, Billing Department
KPI's / Efficiency	

Process Detailed Description

	What	Description	Who	Form	When	Note
1.	Customer contacts	a. visits Help Desk b. Requests online				
2.	Credit Card Collection				After customer contacts	
3.	Verify Credit Card	Verifies credit card for transaction				
4.	Decision Point 1: If credit card is verified then go to Point 9 otherwise end process					
5.	Get Details	CSA collects customer account information	Customer Support Representative		After customer contacts	
6.	Franchise Updates Customer Account	Customer account is updated	Customer Support Representative		After collecting customer information	
7.	Decision Point 2: If Account is not updated then go to Point 8 otherwise proceed to Point 9					
8.	Show Error Reason	Shows error reason to the CSA			When account is not updated	
9.	Update Billing & Franchise's Account	Updates both customer's billing information & franchise account			After customer account is updated	
10	Generate Receipt	Receipt is generated for current transaction			After billing is updated successfully	

3.13.2.3. Account Renewal Process

This process covers all operations required to send reminder to customers exceeding their time/ credit limit

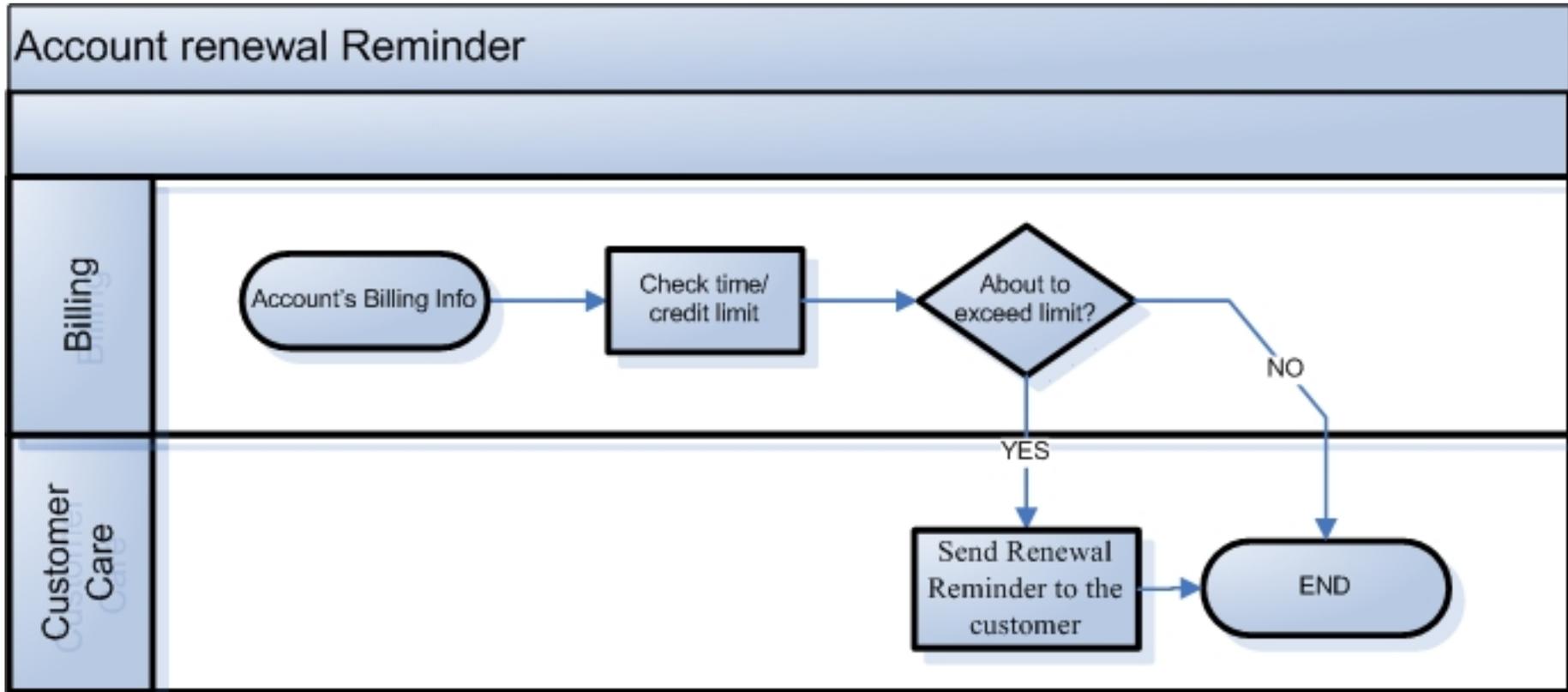


Figure 3.38. Account Renewal Process

Process Elements

Process Owner	Billing Department
Process Input	Customer's Billing Info
Process Output	Reminder Sent to customer
Stakeholders	1. Billing Department 2. Customer Care
KPI's / Efficiency	

Process Detailed Description

	What	Description	Who	Form	When	Note
1.	Customer's Billing Info	Billing information for postpaid customers is received as input				
2.	Check Time/ Credit Limit	Checks if the Time or Credit Limit is exceeded			After Customer's billing information is received	A customer can exceed any or both of its limits i.e. time limit or credit limit
3.	Decision Point 1: If a limit is about to be exceeded then go to Point 5 otherwise end process					
4.	Send Renewal Reminder to the customer	Notifies customer to renew its account before exceeding its limits			When customer is about to exceed its limit	

3.13.1.1. Account Expiration Process

This process covers all operations required to be taken when customer exceeds its Time/ Credit Limit, the process map is showing in figure 3.

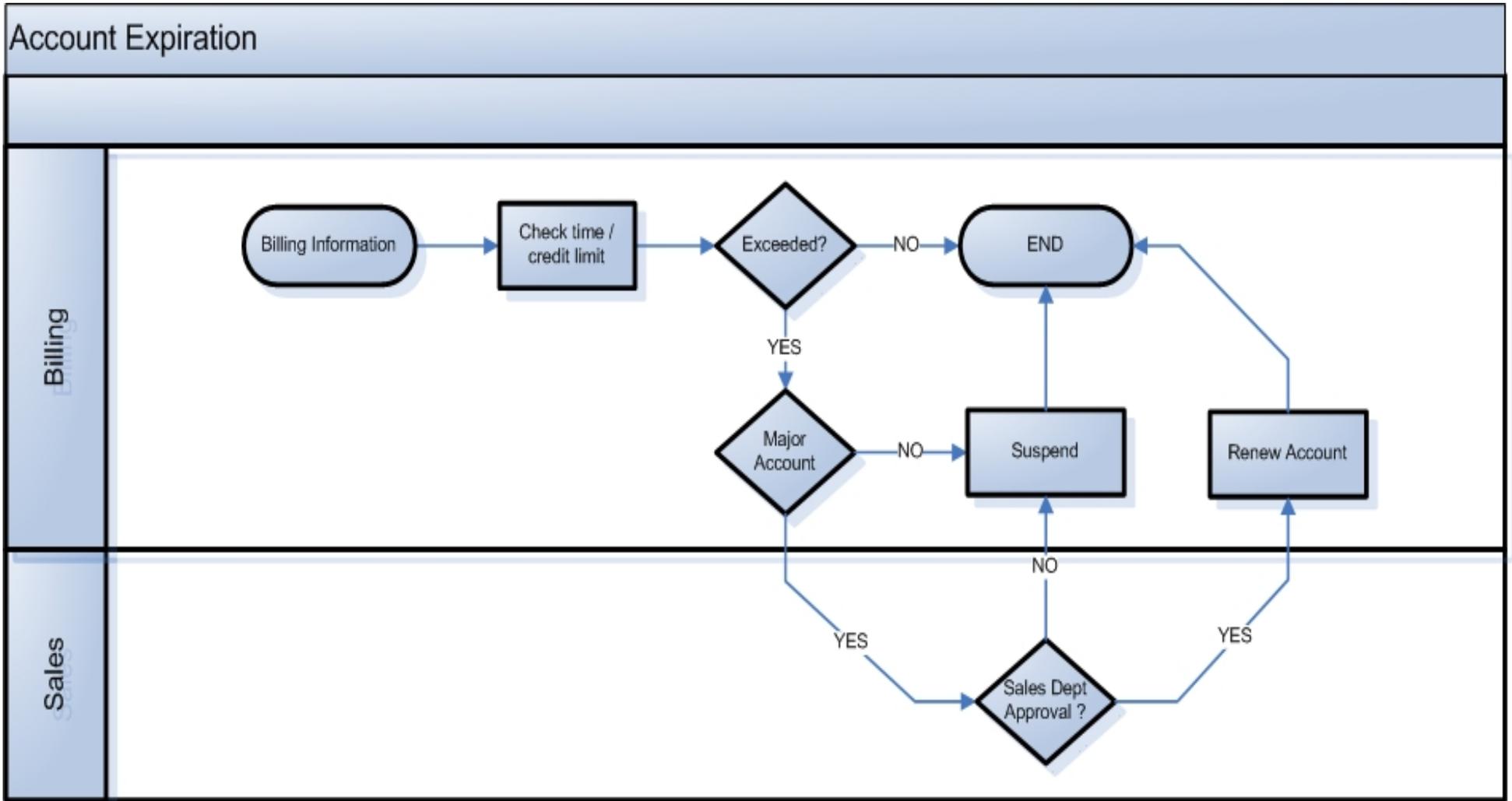


Figure 3.39. Account Expiration Process

Process Elements

Process Owner	Billing Department
Process Input	Customer's Billing Info
Process Output	Account Suspended/ Account Renewed
Stakeholders	1. Billing Department 2. Sales Department
KPI's / Efficiency	

Process Detailed Description

	What	Description	Who	Form	When	Note
1.	Customer's Billing Info	Billing information for postpaid customers is received as input				
2.	Check Time/ Credit Limit	Checks if the Time or Credit Limit is exceeded			After the billing is received as input	
3.	Decision Point 1: If Time/ Credit Limit Exceeded then go to Point 4 otherwise end process					
4.	Decision Point 2: If it is a Major Customer Account then go to Point 5 otherwise proceed to Point 6					
5.	Decision Point 3: If Sales Department doesn't approve account renewal then go to Point 6 otherwise proceed to Point 7					
6.	Suspend	Suspends customer account			After a Time or Credit limit is exceeded	After exceeding a limit, an account is suspended if it is not a major account or it is not approved by sales department
7.	Renew Account	Renews customer account			After Sales Dept. Approval	

3.13.2. Finance Processes

3.13.2.1. Refund Process

This process covers operations required to release payment for a credit note generated

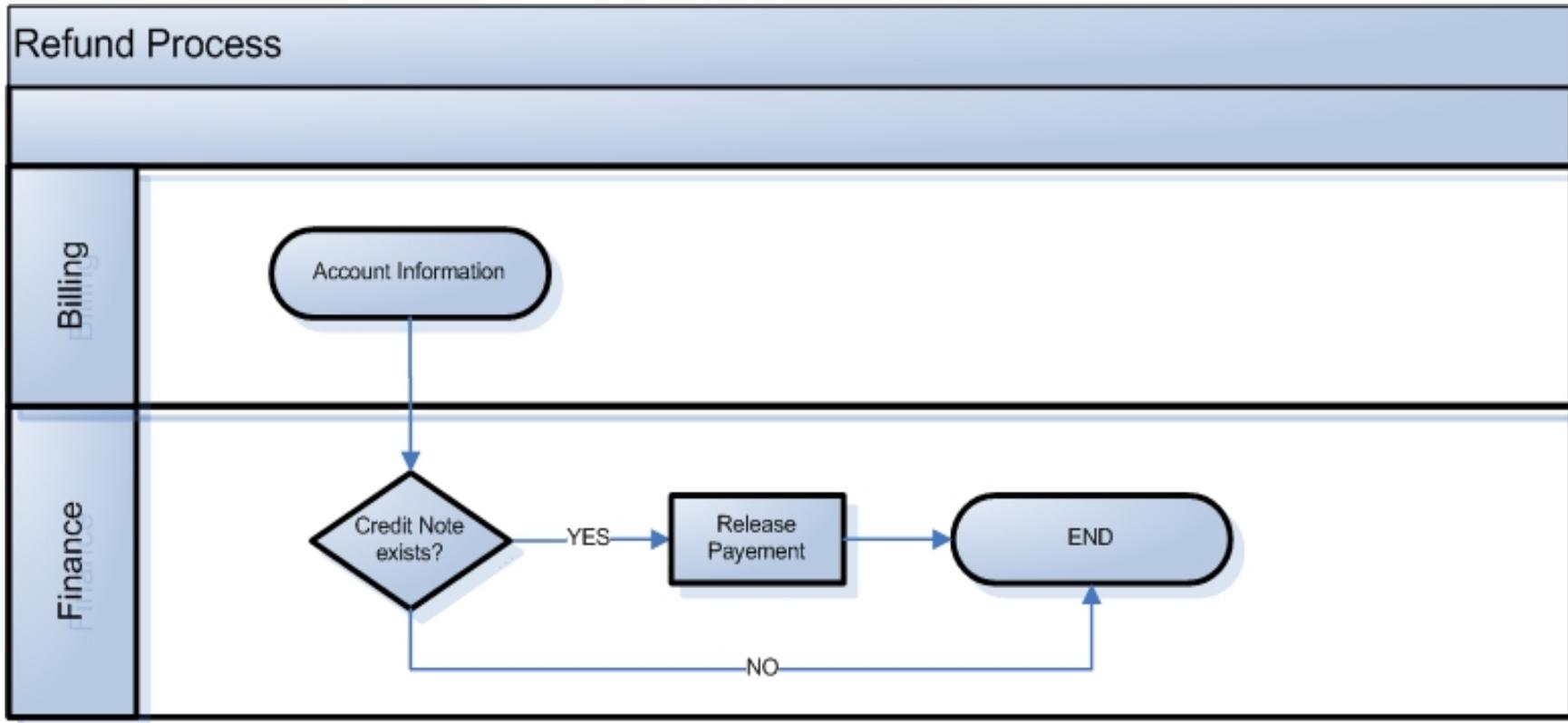


Figure 3.40. Refund Process

Process Elements

Process Owner	Finance Department
Process Input	Customer credit Amount
Process Output	Customer is paid
Stakeholders	1. Finance
KPI's / Efficiency	1. refund request to payment release ratio

Process Detailed Description

	What	Description	Who	Form	When	Note
1.	Account Information	Account Info is received for Refund			Immediately after this process is invoked	A credit note is generated for every refund request by the process initiating Refund process before initiating it.
2.	Decision Point 1: If credit note exists for requested refund then proceed to Point 3 otherwise end process					
3.	Release Payment	Release payment against as credit note			after the credit note is confirmed	Customer can be paid via check or cash

3.13.1. Technical Processes

3.13.1.1. Service Suspension Process

This process covers all operations required to complete a service suspension request.

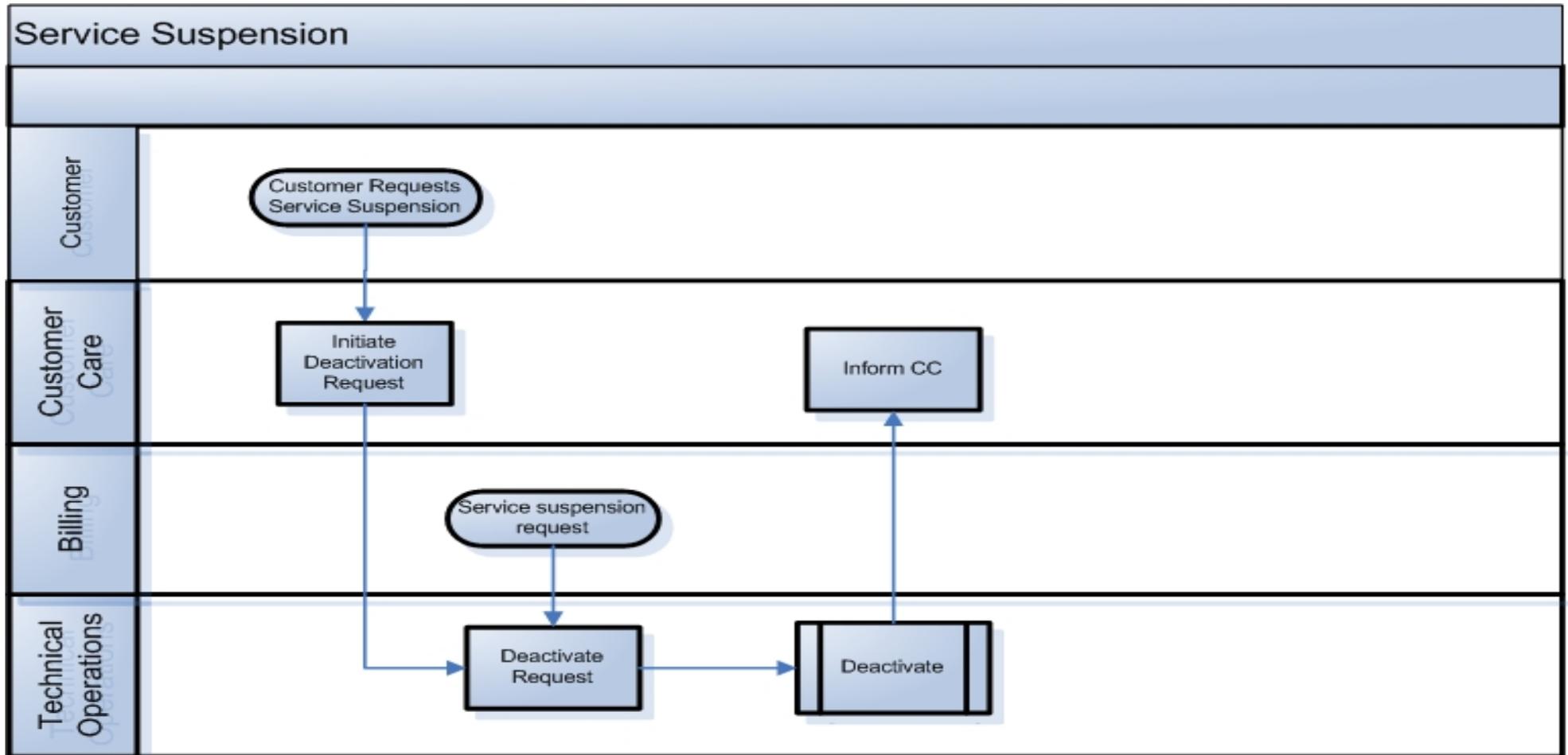


Figure 3.41. Service Suspension Process

Process Elements

Process Owner	Technical Department
Process Input	Customer Account Info
Process Output	Service deactivated
Stakeholders	1. Technical 2. Customer Care 3. Billing
KPI's / Efficiency	1. deactivation request to deactivation time

Process Detailed Description

	What	Description	Who	Form	When	Note
1.	Service Suspension Request	Service suspension can be requested either by customer or by billing department				
2.	Initiate Deactivation request	CSA sends suspension request to Technical Team	Customer Support Agent	Service Deactivation form	After customer requests deactivation	
3.	Deactivate Request	Initiate Deactivate sub process			After suspension request is received from CC or billing	
4.	Deactivate	Deactivate sub process is called				
5.	Inform Customer Care	Customer Care Agent is informed				

3.13.1.2. Customer Activation Process

This process covers all the operations required to activate a customer after receiving activation request

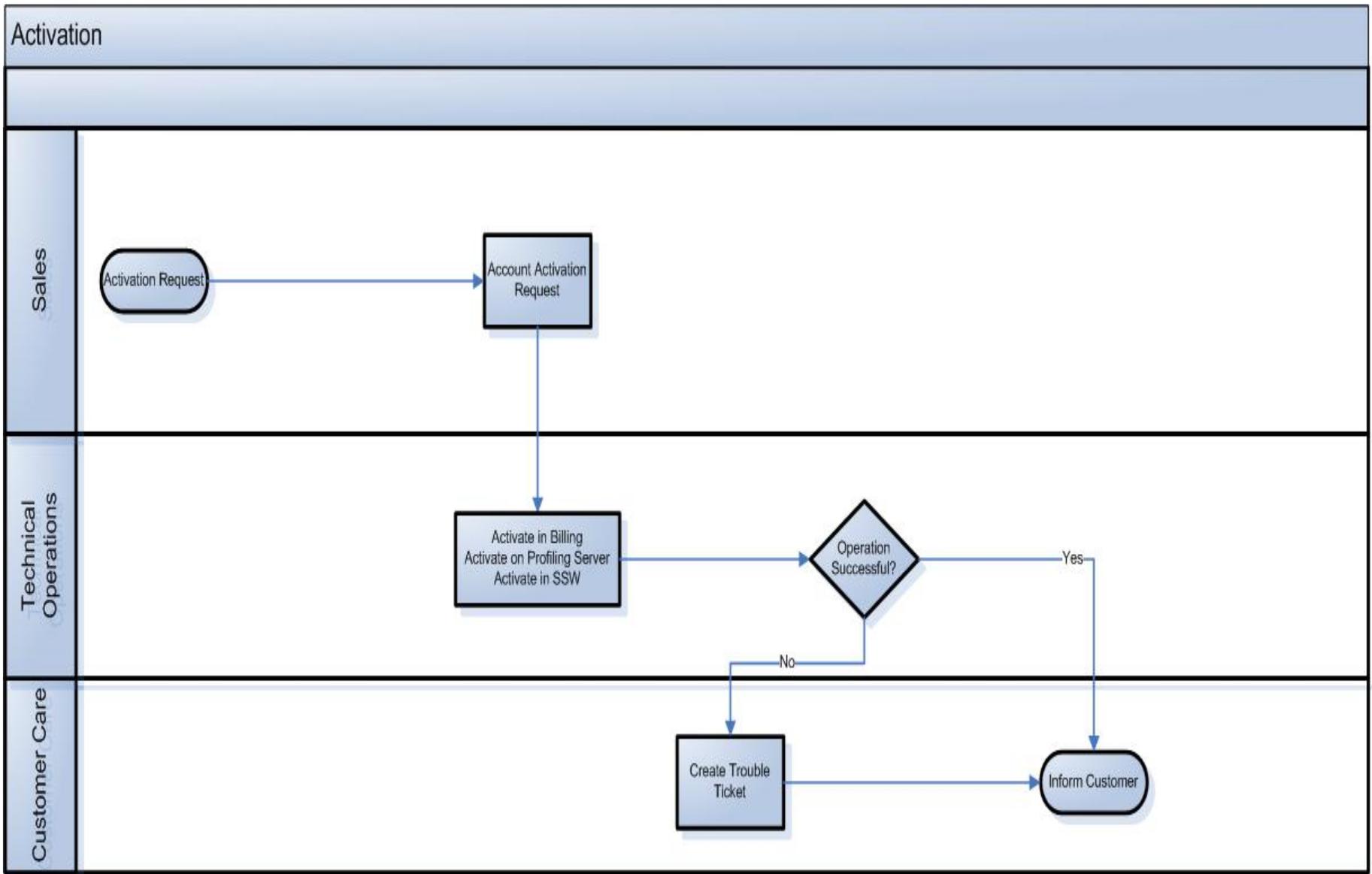


Figure 3.42. Customer Activation Process

Process Elements

Process Owner	Technical Department
Process Input	Account Info
Process Output	Service Activated
Stakeholders	1. Technical Operations 2. Sales
KPI's / Efficiency	1. Trouble Ticket to Activation Requests Ratio

Process Detailed Description

	What	Description	Who	Form	When	Note
1.	Account Activation Request	Account activation request is received from another process			Immediately after this process is invoked	Activation process can be invoked from registration process and recharging process.
2.	Activate in Billing, Profiler, SSW	Actual activation is done in three different places to enable customers to utilize services			Immediately after account activation request is received	
3.	Decision Point 1: If activated successfully on all three servers then go to point 5 otherwise go to point 4					
4.	Create Trouble Ticket	Create a trouble ticket if problem is faced in activation on any of the three servers				
5.	Inform Customer	Customer is informed about the activation status	CC		Immediately after service is activated	Notification is generated to CC and CCR informs customer via phone, email etc.

3.13.1. Operations Processes

3.13.1.1. Customer Provisioning Process

This process covers all the operations required for provisioning a new customer.

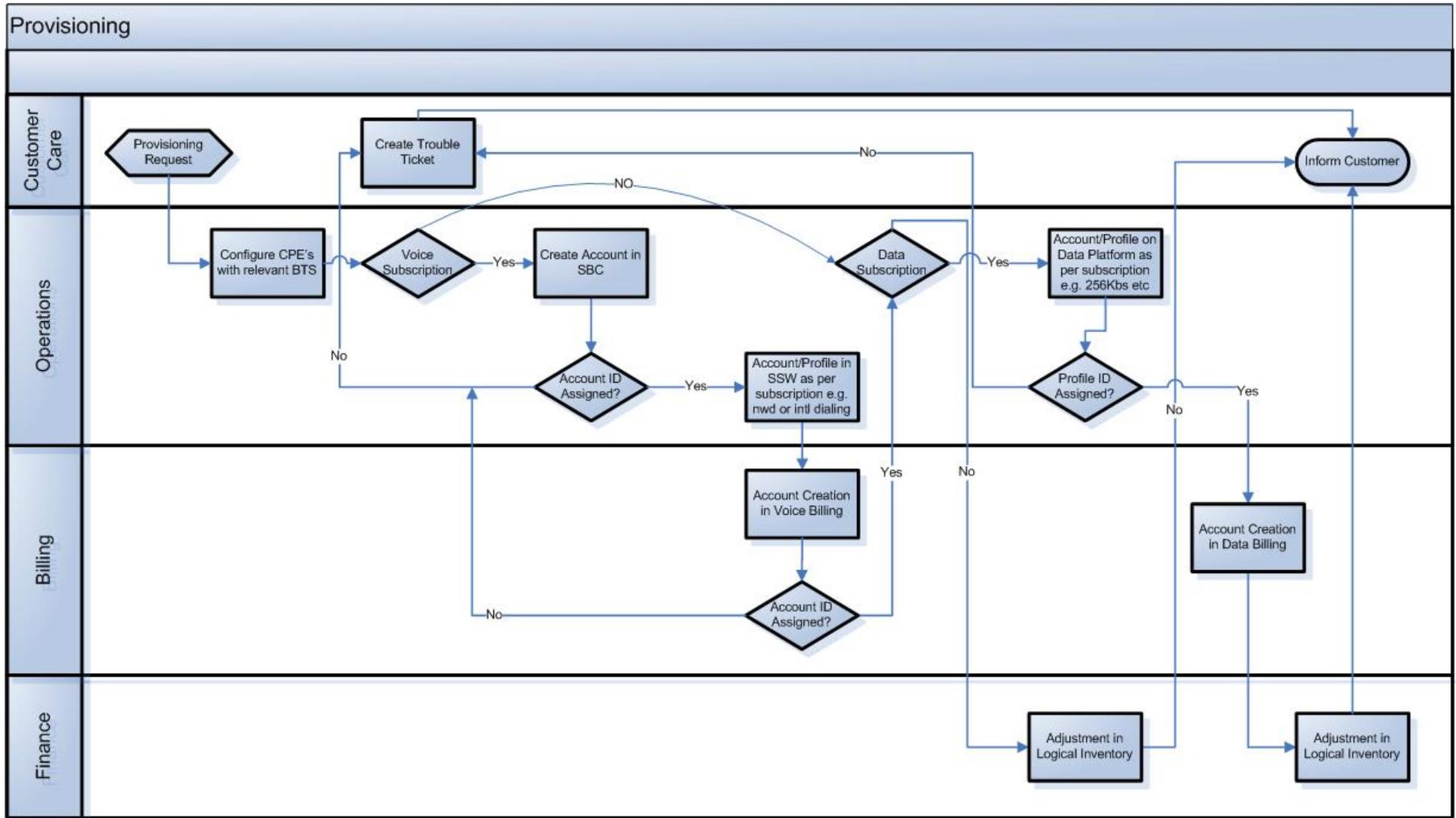


Figure 3.43. Customer provisioning

Process Elements

Process Owner	Operations Department
Process Input	Customer Account Data for New, Updating or Alteration
Process Output	Data and Voice Account Configured
Stakeholders	1. Customer Care 2. Operations 3. Billing
KPI's / Efficiency	1. Percentage Provisioned 2. Trouble Ticket to Provisioning Request Ratio

Process Detailed Description

	What	Description	Who	Form	When	Note
1.	Provisioning Request	Provisioning request is received from another process			Immediately after this process is invoked	Provisioning process can be invoked from registration process or at the time of service up-gradation
2.	Configure CPE	Configure CPE with relevant BTS information			Immediately after provisioning request is received	
3.	Decision Point 1: Check for voice subscription. If yes then go to point 4 otherwise go to 9					
4.	Create Account in SBC	Customer account is create in SBC to allow access to Company's Network				
5.	Decision Point 2: If account ID assigned then go to point 6 otherwise go to point 15					
6.	Create Account on Profiler/SSW	Account on profile server and SSW is created automatically			Immediately after account is created	Keeps track of the level of subscription i.e. nationwide dialing, international dialing etc
7.	Create Account on Voice Billing	To bill customer for voice services, account on billing server is created			Immediately after account on profiler and SSW is created	Account is created automatically
8.	Decision Point 3: If account ID is assigned in Billing then go to point 9 otherwise go to point 16					
9.	Decision Point 4: If customer is subscribing for data then go to point 10 otherwise go to point 14					
10	Create Account on Data Platform	For data services account is created on data platform to allow access			Immediately after it is identified that customer needs data services	Profile server maintains the allocated bandwidth i.e. 256 kbps subscription

11	Decision Point 5:If profile ID assigned on Data Platform then go to point 12 otherwise go to point 16					
12	Account Creation in Data Billing	To bill customers for data, account is created on data billing server			Immediately after account on data platform is created successfully	
13	Adjustment in Logical Inventory (Data)	Logical inventory contains data ports and bandwidth			Immediately after account is created in data billing	
14	Adjustment in Logical Inventory (Voice)	Logical inventory includes voice ports and numbers			Immediately after account is created in voice billing	
15	Inform Customer	Inform customer about status of service				CC notifies actual customer
16	Create Trouble Ticket	In case of problems/errors trouble ticket is generated			When problem is identified	Trouble ticket is forwarded to relevant departments but initially CC receives trouble tickets

3.13.2. Sales Processes

3.13.2.1. New Customer Registration Business Process

This process covers all operations that performed after new customer requesting the service and end before the activation process starting.

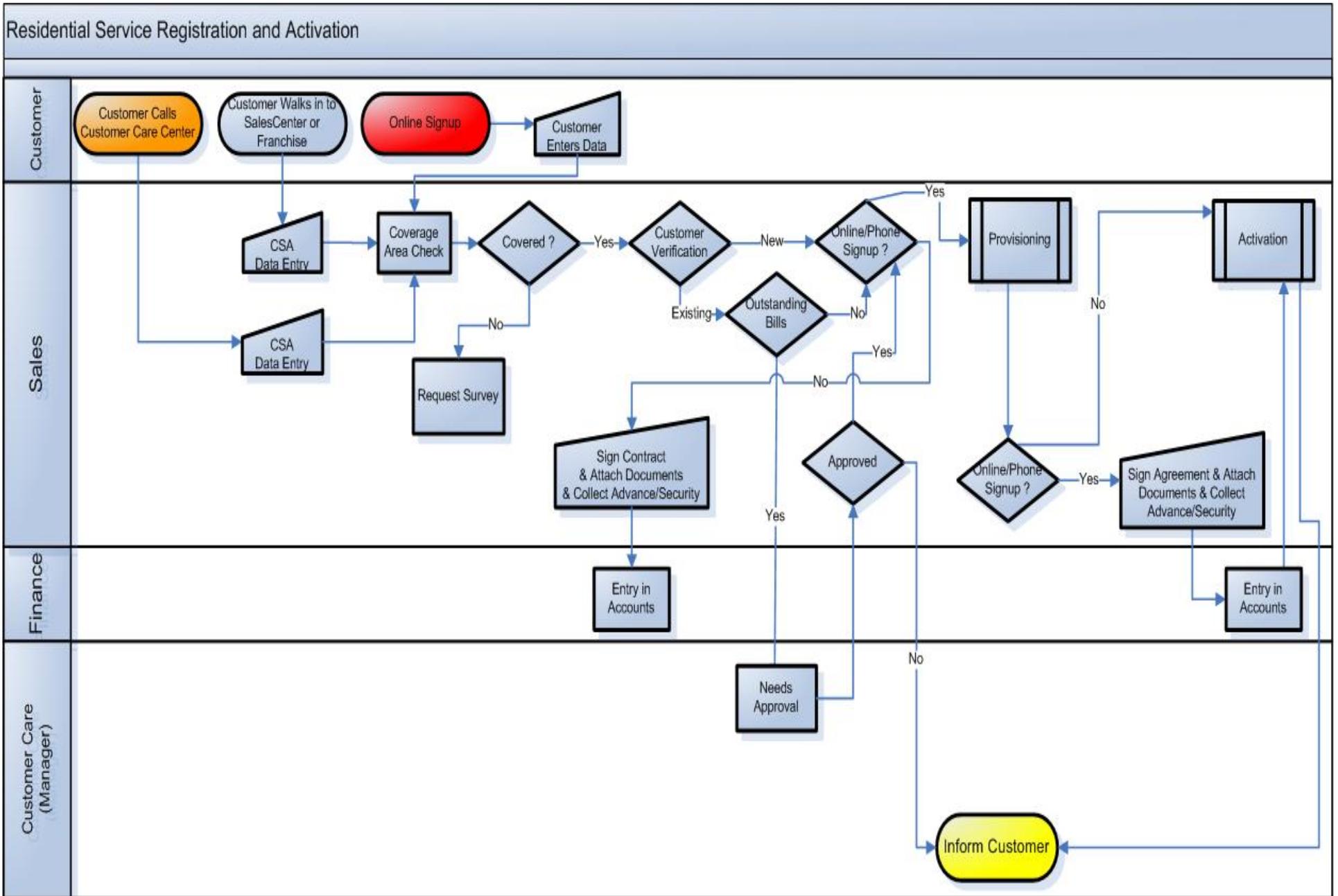


Figure 3.44. New Customer Registration Business Process

Process Elements

Process Owner	Sales Department
Process Input	Customer Interest
Process Output	Customer Request a Service and New Customer Record inserted in the system
Stakeholders	1. Customer 2. Sales Rep 3. Finance
KPI's / Efficiency	1. Customer Satisfaction Above certain % 2. Process Execution Speed i.e. speed of human intervened activities/process

Process Detailed Description

	What	Description	Who	Form	When	Note
1.	Customer Contact	Phone, Visit Franchised Shop, Online	Customer			In case of the requesting the service online or via the phone, the sales rep will visit the customer.
2.	Data Entry	Customer data/information is recorded	Customer /CSA	Data Entry Form	After customer contacts us	In case customer has contacted via phone or online, CSA enters information. Otherwise customer fills up form.
3.	Coverage Area Check	Compare customer record with existing covered area database	Sales Rep		After customer data has been received	
4.	Decision Point 1: If area not covered then request a survey otherwise move to point number 5					
5.	Decision Point 2: If new customer then go to point number 8. If existing customer go to point number 6					
6.	Decision Point 3: If customer has some outstanding bills then go to point number 7 otherwise go to point number 8					
7.	Approval	Get approval from Sales Director in case existing customer has outstanding bills	Sales Director	Approval Form	Immediately after requesting the approval	Approval is required to filter defaulter customers. If not approved inform customer
8.	Decision Point 4: If online sign-up move to point number 9 otherwise move to point 11					
9.	Sign Contract & Collect Security	Sales Rep will get contract signed by customer and collect security or initial deposit	Customer	Contract Form	Immediately after success in point 4	Contract can be in printed form or digital form

10.	Entry In Account	Security/deposit amount is noted into customer account	Finance		Immediately after contract is signed	
11.	Provisioning	Provisioning sub-process is initiated			Immediately after outstanding bills are cleared	
12.	Decision Point 5: If online signup then go to point number 6 and 7 and then go to point 13. Otherwise go to point 13					
13.	Check outstanding bills					
14.	Activation	Activation sub process is initiated			Immediately after it is invoked	
15.	Inform Customer	Inform customer about the status				

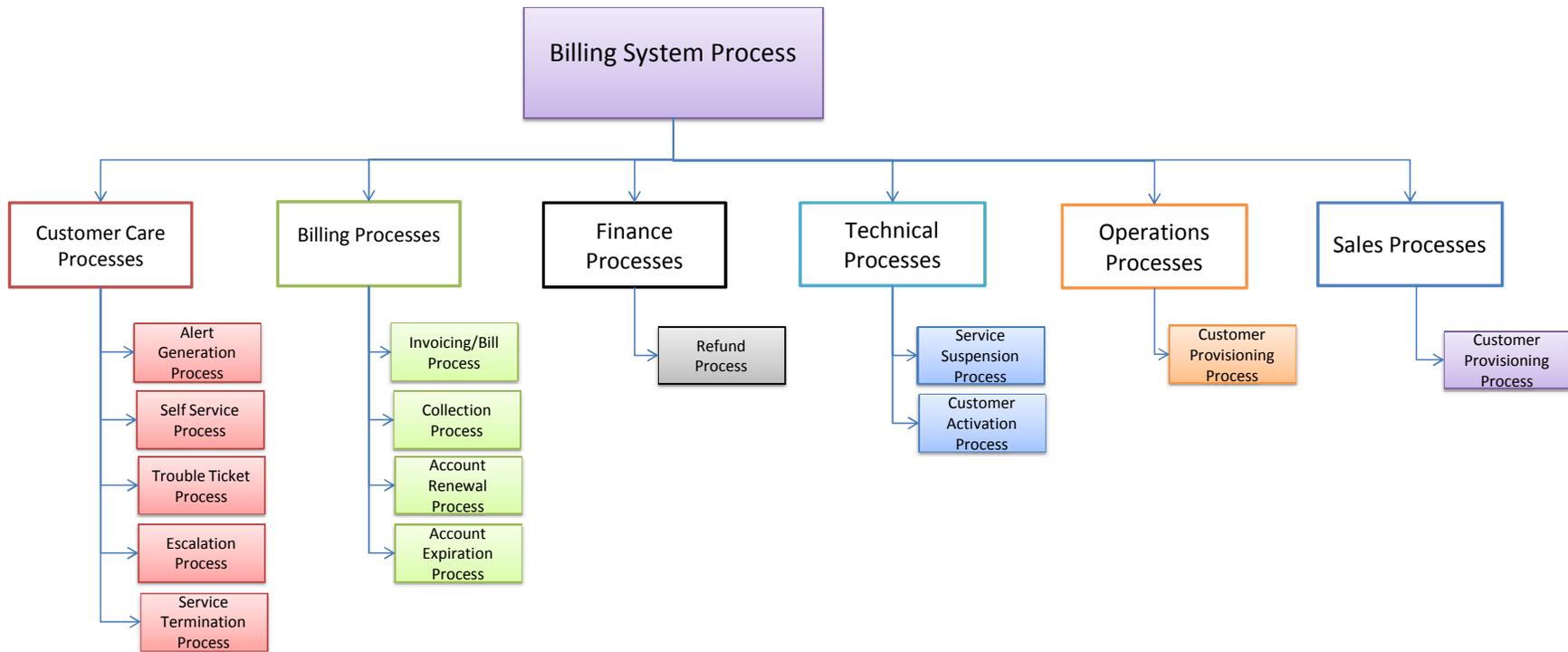


figure 3.30 .

3.14. The interviews

3.14.1. Ms.Sture Ostlund

I had an interview with Ms.Sture Ostlund from Clearwire after he went through the process that was designed and he had some remarks and proposal to improve the system to match the requirements from his side.

The interview was via email and skype on the 24th –April -2008 and he illustrated the following points and I summarized the points as following:

3.14.1.1. **Integration Options available with Wi-Max interface to provision the customer premises equipment (CPE) and the provisioning system**

He suggested that the integration with Wi-Max interface in order to activate the CPE on the WI-MAX network with the correct speed and attributed.

The provisioning process is suitable for voice but we must enhance it to suit the data solution in order to use the same process for all cases not for one solution.

Action Items for this Integration

#	Action item	Responsibility	Remarks
1	We need to design a process of integration with the Wi-Max network	IT	

3.14.1.2. Shaping (decreasing) of Service level in network management system

Requirement

Whenever an active customer reaches the limit of the volume that has been assigned, the system must automatically reduce his speed (after warning him) to a specific and predefined speed. The volume remains the same after the shaping, but the speed at which the download happens will be reduced

Solution

To ensure that this shaping takes place in real time, it has been decided that the shaping will be done purely in Network management system. There will not be any interface to the billing system required for this. The only exception is that whenever the shaping happens, network management system will inform the billing system (through an API call) that the shaping has been done. This information will then be populated by the billing system in the customer history for the CSR to be able to see this. This interface will however be non real time.

Action Items for Shaping services

#	Action item	Responsibility	Remarks
1	Build a shaping process to match the criteria described	IT ,network	
2	Build a reporting process to match the criteria described	IT	

Single username login VS multiple username login

Currently we have only 1 username login will be allowed. While multiple hosts can connect to the CPE (refer to CPE capabilities above for details), all the hosts will login with the same name. This is the way the current ISP business operates anyway and there was no need to change this. What needs to be noted also that Wi-Max is CPE based and network control system is username based.

Action Items for username

#	Action item	Responsibility	Remarks
1	We need to determine what can this affect the current billing system	IT, management	
2	If the effect can be handled we can build a business process	IT	

3.14.1.3. Prepaid Vs Postpaid customers

THE BILLING SYSTEM must support prepaid customers and the system must generate the scratch cards. However, the current system does not have the ability to create scratch cards. There are several decisions that the business needs to take regarding scratch cards / Vouchers like – scratch card types, segments, validity, denominations, services (volume based and/or time based and/or combination of both. In view of the pending decisions regarding the scratch cards from the business

Action Items for Prepaid Vs Postpaid customers

#	Action item	Responsibility	Remarks
1	Get detailed requirements regarding how prepaid customers will be designed in future	IT , Business	

3.14.2. Ms. Jean-Jacques Vangramberen

I had an interview with Ms. Jean-Jacques Vangramberen the Group IT Director in wi-tribe (local Wi-Max operator) he had some remarks and proposal to improve the system to match the requirements, the interview took place in his office in wi-tribe Jordan and discussed the process and he had the following suggestions to match the Wi-Max operation in Jordan.

3.14.2.1. Customer history for the CRM

Mr. Jean Jaques required that all the transactions on the customer to be logged in the customer history in order to give the customer care representative a good view of the customer history and for the marketing purposes also.

Action Items for this Integration

#	Action item	Responsibility	Remarks
1	We need to add a history log after each transaction on the customer account.	IT	

3.14.2.2. Customer hierarchy and loyalty points

Currently we have only 1 level of hierarchy of customers, so suggested to have multiple levels of customer hierarchy in order to increase the loyalty of the customer.

A hierarchy will include the following:

- The first user on the system
- If this customer recommended or invited another person this person should be considered as a lead.
- If the lead became a customer the original customer will benefit from a predefined reward or a discount.
- The new customer can benefit from the same concept.
- If the second customer had a lead that was transformed into a customer the original customer will not benefit from this transaction.

Action Items for username

#	Action item	Responsibility	Remarks
1	We need to build a process for this issue	IT, management, marketing	
2	Study the impact on the system.	IT	

3.14.2.3. Protocol billing

Mr. Jean Jaques recommended to adding protocol billing, protocol billing means the BILLING SYSTEM will have a rating engine. By this engine the system will be able to charge the customer depending on his usage and the type of that usage, which will open a new possibilities to build a customer offers that match the customer needs. But this will require integration with the network control system.

Action Items for Prepaid Vs Postpaid customers

#	Action item	Responsibility	Remarks
1	Building a rating engine and integrate this engine with billing process.	IT ,network	

3.14.3. Mr. Manohar Vaidya

I had an interview with Ms. Manohar Vaidya the billing director Patni computers the company is system integrator for all systems, we asked him about the role of the billing system in achieving a marketing requirements and securing a competitive advantage for Wi-Max Company's worldwide.

His reply may be summarized in the following:

3.14.3.1. Marketing requirement

He replied that the billing system is the main constrain that the marketing may face during the design for their marketing plan any marketing activity, for example is marketing decided to build a special offer for a certain market or niche of people now if the billing don't support either the component of the offer or the categorizing that the marketing require then they will be forced to alter their design and the new design may not serve the objective that they built it for in the first place.

3.14.3.2. Competitive advantage

He replied that if the company managed to build and secure a fixable billing system they will be able to face any changes in the market and meet all the customers demand and form the best offers for each group of customers with the minimal cost while the other compactors may find it hard to cope with such flexibility and low cost.

Chapter 4: the architecture and the process

In order to meet the requirements gathered from the interviews we will go through the points one by one and architect a solution for each point.

4.1. Ms.Sture Ostlund

Regarding the interview with Ms.Sture Ostlund from Clearwire we concluded the following points and the solution is described also in the point

4.1.1. Integration Options available with Wi-Max interface to provision the customer premises equipment (CPE) and the provisioning system.

The following flow describes how the system should behave in order to achieve the requested task and the architected for the solution.

Customer registration

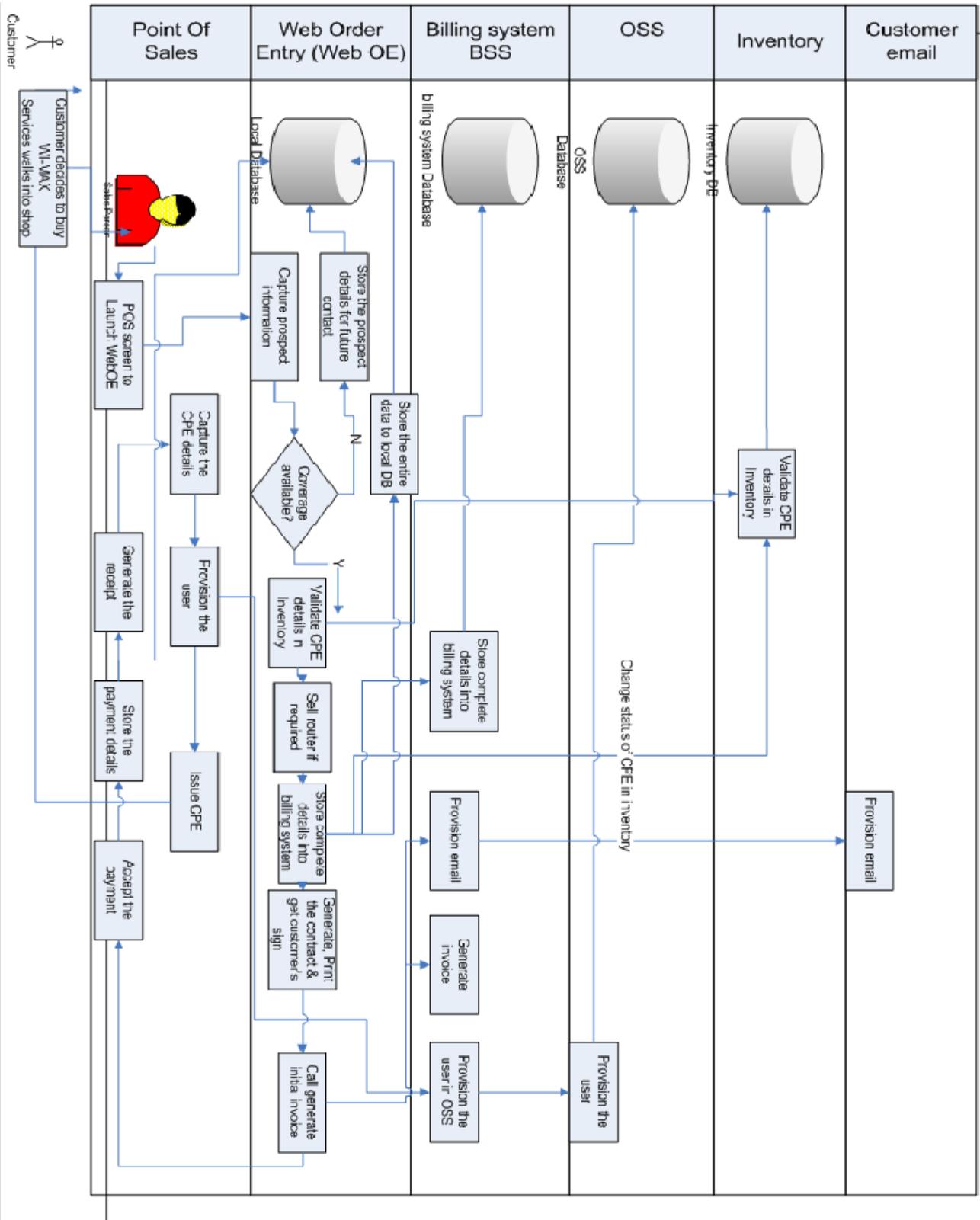


Figure 4.1. Customer registration

4.1.2. Shaping (decreasing) of Service level in network management system

We will define a table in network control software which will capture the service profile (offer category) downgrade scenario. Our understanding is that a service profile essentially captures the following basic data:

- 1.) Volume (2 Gb, 5 Gb, 10 Gb and so on)
- 2.) Speed information (128 Kbps, 256 Kbps, 512 Kbps, and 1 MBPS etc.)

Now whenever a volume limit is reached by the customer, then network control software will first inform the customer and then based on the table that offer defines, it will shape the service to the next service profile.

The table will essentially contain the following fields

Original Service Profile	1 st change service profile	2 nd change service profile	3 rd change service profile	Last change
SP1 (1 Mbps, 2 Gb)	SP2 (512 Kbps, 1 Gb)	SP3 (256 Kbps, 500 Mb)	SP4 (128 Kbps, unlimited download)	Block

Therefore, the process in network control software will be as follows:

Step 1: Once the customer reaches the volume limit, the customer is warned that he is going to be shaped (appropriate communication message needs then to be confirmed by WI-TRIBE)

Step 2: network control software checks the table above and reassigns the service profile as defined in the table

Step 2.1 network control software informs the billing system about the fact that Shaping has been done

Step 3: When the volume limit is reached for the changed service profile, the step 2 is repeated till the last change in service profile.

It is possible that it is very much possible that the table defined above will have only one step rather than 3 or 4 steps. But, there should be flexibility to define at least up to 4 levels.

Please note that whenever a service profile is changed by network control software, the information about this change will need to be communicated to Billing system. Network control software will create a specific event type for this communication and work with billing system to do the integration. Network management system will also provide an API that can be called by Customer care on demand to update the customer history.

Whenever billing system runs the bill cycle for the postpaid customers, it will call the appropriate API's in network control software to reset the limits.

The volume usage monitored will be the summation of both uplink volume and downlink volume and this aggregate volume will be used to determine if the customer has reached the volume limit

Information to the customers:

While in theory it is possible to inform customers by displaying a web page when they are going to be shaped, practically, implementing this faces quite a few difficulties especially when the customer does not have a browser open. Therefore, whenever shaping is going to occur, network control software will inform the customer via email.

Clarification to network control software on this:

- a.) It is required that the billing system to pass on the customer email address apart from user name, password and Mac address of CPE when The billing system provisions a customer.
- b.) It is possible that network management system also sends an SMS if the mobile number is provided. And will the mobile number also be added to the data items mentioned in the point 1 above

Network control software should be configured with a report which will allow us to easily spot the heavy users.

4.1.3. Single username login VS multiple username login

This point will have a huge impact on the system therefore it will be ignored in this stage and will be studied later on in the future or to relevant studies.

The reason that this point will cause a huge impact is:

- a. The customer hierarchy will be affected and the billing process will need to revision
- b. The accounting (the download and time) will be affected
- c. Most of the network management systems don't support this feature.

Therefore we will leave this feature out of our architecture.

4.1.4. Prepaid Vs Postpaid customers

- Prepaid functionalities should support the following : -
 - System Architecture
 - Offer and Tariff Configuration Architecture.
 - Customer Relationship management
 - Sales Management
 - Account Receivable Management
 - Billing Management
 - Electronic transactions
 - change profile
 - payments
 - Inventory Module
 - Report Module
- **System Architecture** : -
 - System should support multiple organization hierarchy structure i.e. should support various markets under one Corporate.
 - Network management system server should store user name market wise.
- **Offer and Tariff Configuration Architecture** : -
 - System should support multiple organization hierarchy structure i.e. same offers can be configured all across markets or can configure offer market wise...

- **Customer Relationship Management: -**

- Business / Sales team should determine the customer and service attributes and informed the IT in order to store it electronically or physically
- Option 1: - OE module should scan customer application form and update information in the database → this require scanner at the centralized location.
- Option 2: - OE module should capture customer details at the time when the customer login → customer will insert his information
- Prepaid CRM should be in place → CRM prepaid functionalities include: -
 - Trouble ticket management
- Front end screen should be available to CSR to update, modify, create, add and delete any customer related information (CPE, offer)
- Query screen should be available on the basis of various customer attributes
- My account screen available for prepaid customers to check the following: -
 - Existing offer
 - Subscription details
 - Recharge history and balance available
 - Generate a query or complains
- Adjustments and credit notes and debit notes should be integrated with prepaid network management system server
 - Front End / Bulk Uploading
- System should support shaping of customers real time and should treat the customer as soon as customer recharges.
- System should support migration of prepaid customer from prepaid to postpaid customer.
- System should support migration of postpaid customer from postpaid to prepaid customer.

- **Sales Management: -**

- Business / Sales team should prepared the sales process for the prepaid products
- Prepaid Support System to be in place for managing Markets / City / Distributor / Retail Network.
- System should support target allocation and process commissions automatically based on achievement of targets.

- Account Receivable Management: -
 - Voucher Management
 - Creation of PIN numbers in encrypted format
 - Generation of the vouchers and generate output file for print vendor in encrypted format
 - Printing of the vouchers
 - Scratch cards
 - Payment Processing
 - option for customer to recharge / subscription through paper voucher → network management system to support this functionality
 - through E-charge → network management system to support this functionality
 - through banks / ATMs → network management system should integrated with payment gateway of the banks
- Billing Management
 - Charging Mechanism
 - One Time Charging of various services
 - Periodic Charging on Daily / Monthly / Quarterly/ Yearly Basis
 - System should support Try and Buy Concept
 - Carry Forward : System should deduct outstanding balance at the time of recharge , if any
 - System should restrict service when customer reached the available balance.
 - CDR Capturing and Processing
 - network management system Server CDRs should be processed and stored for audit and customer reference
 - CDRs should flag voice and Internet usage CDR separately
 - Provision system should support volume and time based real time billing

- Inventory Management: -
 - Inventory Module should capture details of CPE postpaid and prepaid business
 - Front End/ Batch Upload Functionality
 - Mapping of CPE at warehouse level
 - Assign/ Unassigned stock to warehouse
 - Supports Warehouse to warehouse transfer functionality
 - Captures Stock in return information along with reasons
 - Equipment Search Mechanism

- Provision system Server : -
 - Provision system should support Bulk activation
 - Provision system should support pre activated kit (CPE, username and password)
 - Provision system should support selling multiple prepaid offers (system should map offer to user online)
 - Provision system should support migration offer (change prepaid offers) based on any one of the following
 - Recharge Denomination
 - Promotional Offers
 - Usage Threshold
 - Volume Threshold
 - Age on Network
 - Balance Left (Shaping)

- Report Management: -
 - Activation Reports
 - Balance Reports
 - Recharge Report
 - Usage Reports
 - Churn Report
 - Besides this system should support user defined reports

4.2. Ms. Jean-Jacques Vangramberen

Regarding the interview with Ms. Jean-Jacques Vangramberen we concluded the following points and the solution is described also in the point.

4.2.1. *Customer history for the CRM*

In order to achieve the requirement we must add a step in each process adding a record for this process in the customer history.

The data that should be in the history record are:

- The customer info (username, customer number)
- The date of the process.
- The type of that process (payment, change info, etc...)
- The system user who did this transaction or the customer id the customer did it by himself using the system portal
- The machine info that the process was placed on
- The state (output) of the process.

After that we need to determine the level of privilege that is required to see the history record.

4.2.2. Customer hierarchy and loyalty points

This point will have a huge impact on the system therefore it will be ignored in this stage and will be studied later on in the future or to relevant studies.

The reason that this point will cause a huge impact is:

- d. The customer hierarchy will be affected and the billing process will need to revision
- e. Pricing will be affected
- f. A separate module must be build to interface with such requirement.

This feature can be handled through an external system to keep track of the customers and their loyalty points. If this can be accomplished the pricing can be controlled by discounts and credit notes in the original system, and some integration will be required.

Therefore we will leave this feature out of our architecture and consider it in future plans.

4.2.3. Protocol billing

This point will have a huge impact on the system therefore it will be ignored in this stage and will be studied later on in the future or to relevant studies.

The reason that this point will cause a huge impact is:

Very high integration between the billing system and the network management system

We need to specify a network system and how it reacts to the protocol and is it possible to separate the traffic depending on the protocol.

Depending on output of the pervious points we can build a process for such requirement.

This special requirement can't be handled in through an external system because its affects the billing system core system if we attempt to build this feature we will end in building a full billing module. And this is out of our scope in this study.

Therefore we will leave this feature out of our architecture and consider it in future plans.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

The billing system is one of the most basic components in any telecommunication company, running and administrating the billing system is one of the hardest tasks in the telecommunication companies.

The effeminacy of running and administrating the billing system depends on two factors, First: the management skills and the understanding the work flows of the business, Second: the IT and Technical knowledge and abilities of the people running the system. If any factor is affected and may cause in incorrect implementation of the system and that may lead to catastrophic results for the company.

In this research we focused on the management and business part of the equation, by studding the workflows of the operation and designing the missing parts demanded by the Wi-MAX operators.

The people interviewed in this research are considered to be experts and leaders in their fields and the billing system is one of their main applications they are operating. Still interviewing more experts in the Wi-MAX operators will push the design closer to completion.

The results concluded in the research will help the WI-MAX operators in implanting the billing system in their companies, but the implementation depends on the BSS and the OSS and some of the results may not be applicable for implementation because of a system limitation.

Conclusions

We can conclude that the billing system is one of the core components in the Wi-Max operation therefore we can't launch a Wi-Max solution without having a proper billing system that matches the business and the market requirements.

These requirements can defer from one market to another but mainly they are very common between all the businesses in the Wi-Max industry.

The billing system controls all the basic and most important tasks in the Wi-Max solution.

We can see that there is no huge deference between data Internet and the Wi-Max billing.

We can see that from the requirement that was asked to improve, they where all generic except the one for the integration with the wireless control system.

So mainly the Wi-Max billing is very similar to the telecom data Internet billing and a basic Internet billing can be modified to run for Wi-Max companies

One of the most important activates that must kept under constant improvements are the billing system requirements.

Because any rigidness in any one of the billing system activates will case the company to lose the ability to achieve excellence in the market

One of the most important solutions to overcome any obstacles that the billing system may face is to take this function into an external system and then design the process around the external system.

We can go for such solution in case of high cost to alter any billing system process or in case of limited time to achieve such functions.

if the company managed to build and secure a fixable billing system they will be able to face any changes in the market and meet all the customers demand and form the best offers for each group of customers with the minimal cost while the other compactors may find it hard to cope with such flexibility and low cost.

the billing system is the main constrain that the marketing may face during the design for their marketing plan any marketing activity, for example is marketing decided to build a special offer for a certain market or niche of people now if the billing don't support either the component of the offer or the categorizing that the marketing require then they will be forced to alter their design and the new design may not serve the objective that they built it for in the first place.

Recommendations and future reseach opportunities

- There is some requirement that we didn't manage to build in this research, so the main recommendation is to see what the ability to complete such requirements is.
- Build any incomplete external system that was required by this research and build a complete flow for such systems and the interaction with the billing systems.
- Take the research even more further and make more interviews with deferent key persons in deferent companies and math there requirements
- The implementation part may take place in a WI-MAX operator, finding a Wi-Max operator to adopt this research and implementing it will give the research a practical dimension.

Appendix A List of Terms

AAA	Authentication, Authorisation and Accounting
ACD	Automatic Call Distribution
AU	Authentication
B2B	Business To Business
B2C	Business To Consumer
BAM	Business Activity Monitoring
BB	Broadband
BSS	Business Support System
CDR	Call Detail (Data) Record
CM	Customer Management
CMS	Content Management System
COSAR	Cable Operator Service Activation Request
CPE	Customer Premise Equipment
CTI	Computer Telephony Integration
DB	Database
DM	Data Mart
DQ	Directory Query
DRM	Digital Rights Management
DSLAM	Digital Subscriber Line Access Multiplexers
DTMF	Dual Tone Multi Frequency
EAI	Enterprise Application Integration
EDR	Event Detail (Data) Record
ERP	Enterprise Resource Planning

ETL	Extract, Transform, Load
FDS	Fraud Detection System
FO	Firm Order
GNP	Geographic Number Portability
HTTP	Hyper Text Transfer Protocol
INA	Inter Network Accounting
IP	Internet Protocol
IT	Information Technology
IVR	Interactive Voice Response
JMS	Java Messaging System
LDAP	Lightweight Directory Access Protocol
LIR	Local Internet Registry
NLP	Neuro Linguistic Programming
LLU	Local Loop Unbundling
M&A	Mergers & Acquisitions
MACD	Moves, Adds, Changes & Disconnections
MMS	Multi Media Messaging Service
MMSC	Multi Media Messaging Service Centre
MRC	Monthly Recurring Charge
MSMQ	Microsoft Message Queuing
NOC	Network Operations Centre
OCC	Other Charges Credits
ODS	Operational Data Store
OE	Order Entry
OLAP	On-Line Analytical Processing

OLO	Other Licence Operator
OM	Order Management
OSS	Operations Support System
PDA	Personal Digital Assistant
POE	Pre Order Enquiry
POS	Point of Sale
RA	Revenue Assurance
RADIUS	Remote Authentication Dial-In User Service
RIPE	Réseaux Information Providers Européen
RRE	Returns Repair and Exchange
SAN	Storage Area (Access) Network
SCM	Supply Chain Management
SLA	Service Level Agreement
SMS	Short Message Service
SMSC	Short Message Service Centre
SNMP	Simple Network Management Protocol
SOA	Service Oriented Architecture
SS7	Signaling System #7
TBD	To Be Determined
TCR	Tariff Change Request
TT	Trouble Ticket
UD	User Directory
UMS	Unified Messaging System
VAS	Value Added Services
VOD	Video on Demand

XML eXtensible Markup Language

CSV Comma Separated Value

DSA Data Staging Area

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