

Vodafone Spain "As is" Architecture

Enterprise Architecture

Version 4.0
December 2006



This document comprises proprietary and confidential information and copyright material belonging to Vodafone Spain S.A. It must not be reproduced, used, published, or disclosed to third parties without the prior written consent of Vodafone Spain S.A.

The information in this document is subject to change without notice.

All trademarks acknowledged.

Vodafone Spain S.A.

Madrid
(Spain)

1 Table of Contents

| | | |
|-----------|--|-----------|
| 1 | TABLE OF CONTENTS | 3 |
| 2 | ADDITIONAL REFERENCES | 5 |
| 2.1 | TABLE OF FIGURES | 5 |
| 3 | DOCUMENT CONTROL | 6 |
| 3.1 | PURPOSE | 6 |
| 3.2 | REVISION HISTORY | 6 |
| 3.3 | CONTRIBUTORS | 7 |
| 3.4 | DISTRIBUTION LIST | 7 |
| 3.5 | DOCUMENT REFERENCES | 7 |
| 4 | BILLING | 9 |
| 4.1 | OVERVIEW | 9 |
| 4.2 | HIGH-LEVEL ARCHITECTURE | 9 |
| 4.3 | KEY INTERACTIONS | 14 |
| 4.4 | PLANNED CHANGES AND KNOWN ARCHITECTURAL ISSUES | 19 |
| 5 | BUSINESS INTELLIGENCE AND MIS | 20 |
| 5.1 | OVERVIEW | 20 |
| 5.2 | HIGH-LEVEL ARCHITECTURE | 20 |
| 5.3 | KEY INTERACTIONS | 24 |
| 5.4 | PLANNED CHANGES AND KNOWN ARCHITECTURAL ISSUES | 27 |
| 6 | CUSTOMER MANAGEMENT | 28 |
| 6.1 | OVERVIEW | 28 |
| 6.2 | HIGH-LEVEL ARCHITECTURE | 28 |
| 6.3 | KEY INTERACTIONS | 35 |
| 6.4 | PLANNED CHANGES AND KNOWN ARCHITECTURAL ISSUES | 43 |
| 7 | ENTERPRISE MANAGEMENT | 44 |
| 7.1 | OVERVIEW | 44 |
| 7.2 | HIGH-LEVEL ARCHITECTURE | 45 |
| 7.3 | KEY INTERACTIONS | 53 |
| 7.4 | PLANNED CHANGES AND KNOWN ARCHITECTURAL ISSUES | 56 |
| 8 | IT INTEGRATION | 58 |
| 8.1 | OVERVIEW | 58 |
| 8.2 | HIGH-LEVEL ARCHITECTURE | 59 |
| 8.3 | KEY INTERACTIONS | 62 |
| 8.4 | PLANNED CHANGES AND KNOWN ARCHITECTURAL ISSUES | 62 |
| 9 | IT RESOURCE MANAGEMENT | 64 |
| 9.1 | OVERVIEW | 64 |
| 9.2 | HIGH-LEVEL ARCHITECTURE | 64 |
| 9.3 | KEY INTERACTIONS | 67 |
| 9.4 | PLANNED CHANGES AND KNOWN ARCHITECTURAL ISSUES | 68 |
| 10 | IT SERVICE MANAGEMENT | 69 |
| 10.1 | OVERVIEW | 69 |
| 10.2 | HIGH-LEVEL ARCHITECTURE | 69 |
| 10.3 | KEY INTERACTIONS | 72 |
| 10.4 | PLANNED CHANGES AND KNOWN ARCHITECTURAL ISSUES | 72 |
| 11 | PARTNER MANAGEMENT | 73 |
| 11.1 | OVERVIEW | 73 |

| | |
|--|------------|
| 11.2 HIGH-LEVEL ARCHITECTURE | 73 |
| 11.3 KEY INTERACTIONS..... | 76 |
| 11.4 PLANNED CHANGES AND KNOWN ARCHITECTURAL ISSUES..... | 76 |
| 12 PRODUCT MANAGEMENT | 77 |
| 12.1 OVERVIEW | 77 |
| 12.2 HIGH-LEVEL ARCHITECTURE..... | 77 |
| 12.3 KEY INTERACTIONS..... | 80 |
| 12.4 PLANNED CHANGES AND KNOWN ARCHITECTURAL ISSUES..... | 80 |
| 13 PROVISIONING AND FULFILMENT | 81 |
| 13.1 OVERVIEW | 81 |
| 13.2 HIGH-LEVEL ARCHITECTURE..... | 81 |
| 13.3 KEY INTERACTIONS..... | 84 |
| 13.4 PLANNED CHANGES AND KNOWN ARCHITECTURAL ISSUES..... | 86 |
| 14 RATING | 87 |
| 14.1 OVERVIEW | 87 |
| 14.2 HIGH-LEVEL ARCHITECTURE..... | 87 |
| 14.3 KEY INTERACTIONS..... | 90 |
| 14.4 PLANNED CHANGES AND KNOWN ARCHITECTURAL ISSUES..... | 92 |
| 15 SALES AND MARKETING | 93 |
| 15.1 OVERVIEW | 93 |
| 15.2 HIGH-LEVEL ARCHITECTURE..... | 93 |
| 15.3 KEY INTERACTIONS..... | 97 |
| 15.4 PLANNED CHANGES AND KNOWN ARCHITECTURAL ISSUES..... | 102 |
| 16 APPENDIX – SYSTEM MAPPING | 103 |

2 Additional References

2.1 Table of Figures

| | |
|---|----|
| Figure 1 - Billing High Level Architecture | 10 |
| Figure 2 – BI & MIS High-Level Architecture..... | 21 |
| Figure 3 - Customer Management High Level Architecture | 29 |
| Figure 4 – Enterprise Management High Level Architecture | 46 |
| Figure 5 – IT Integration High Level Architecture..... | 60 |
| Figure 6 – IT Resource Management High Level Architecture | 65 |
| Figure 7 – IT Service Management High Level Architecture..... | 70 |
| Figure 8 – Partner Management High Level Architecture | 74 |
| Figure 9 – Product Management High Level Architecture | 78 |
| Figure 10 – Provision & Fulfillment High Level Architecture | 82 |
| Figure 11 - Rating High Level Architecture | 88 |
| Figure 12 – Sales & Marketing High Level Architecture..... | 94 |

3 Document Control

3.1 Purpose

This document was initially written during the Architecture Baseline activity to capture and document a baseline of systems that form part of the IT Architecture for Vodafone Spain. Every three months, a new version of the VF Spain Architecture document is launched and each new version is the result of gathered information from the projects and the information system contact people.

This document represents a snapshot of the architecture at a high level in November-December 2006. Similar documents are produced for each Vodafone OpCo and they are used to identify synergies among OpCos and know their architecture baseline.

The architecture baseline purpose is:

- To maintain a centralized repository of all high level information of the VF ES systems map; it provides a reliable consult tool for projects, re-engineering initiatives and other activities that need a functional architecture baseline of the systems.
- To provide a single, consolidated, up-to-date repository of the architecture information for all OpCo's.
- To facilitate like-for-like comparison of what IT systems an OpCo has used to implement a particular function.
- To document a high level explanation of how a function is implemented in each OpCo, the system interactions and known architectural issues.
- To support sharing of 'best practice' implementations.

This document is completed by:

- Existing documentation with a greater level of detail that is referenced within this document.
- Information that is maintained and updated in ARIS (Enterprise Architecture Tool), that provides the systems inventory and their interfaces.

A new template has been issued in December 2006 and a new version has been generated, the 4.0. This new revision includes a new organisation of the overall document, new standardised diagrams and aims to set up a new standard throughout the OpCos, more rational and easy to understand.

3.2 Revision History

| Date | Version | Description of changes made | Author |
|------------|---------|---|--|
| 21/12/2005 | 1.0 | Review comments incorporated. Issued | Rob Marshall |
| 04/01/2006 | 1.1 | Added domain mapping and appendix. Re-issued | Alasdair Gordon |
| 18/04/2006 | 2.0 | New As Is version | Spanish Architects |
| 30/06/2006 | 2.1 | New As Is release | Spanish Architects |
| 27/06/2006 | 2.5 | New As Is release after integration with ARIS tool | Spanish Architects |
| 29/09/2006 | 3.0 | New As Is version. September 2006 | Spanish Architects |
| 04/12/2006 | 4.0 | New Document Template & Organisation. New Diagrams. | Architecture (ES) and Alejandro Flores (Global EA) |

3.3 Contributors

The following people have contributed to this document:

| Name | Role |
|--------------------------|--------------------------------------|
| Alfonso Gomez | Strategy & Architecture Manager - EA |
| Pilar Vallejo De Vicente | Architect – EA |
| Silvia Sebastian Martin | Architect – EA |
| David Cerezo | Architect – EA |
| Emilio Garcia | Architect – EA |
| Sandra Medina | Architect – EA |
| Rocio Gonzalez | Architect – EA |
| Nora Miguelez Velasco | Architect – EA |
| Alejandro Flores | Global Enterprise Architecture - ACA |

3.4 Distribution List

| Name | Purpose |
|--------------------------|-------------|
| Victor Bravo | Information |
| Teresa Reyes | Information |
| Ana Arrese | Information |
| Oscar Gonzalez | Information |
| María Laguarda | Information |
| Benito Oliveros | Information |
| Juan Griñán | Information |
| Javier Martín de Serrano | Information |
| Josep Costa | Information |
| Carlos de la Fuente | Information |
| Fermín Navarro | Information |
| Angel Alvarez | Information |

3.5 Document References

URL of Spain folder in Architecture Teamroom:

https://teamrooms2-vista.vodafone.com/eRoom/Global22/ISTechnicalArchitecture/0_82578

URL of ‘Across OpCos’ folder in teamroom:

https://teamrooms2-vista.vodafone.com/eRoom/Global22/ISTechnicalArchitecture/0_824fb

| Reference Number | Document Name | | Document Location |
|------------------|--|--|--|
| 01 | Vodafone Spain Application Portfolio baseline.xls | List of Applications | Existing Systems Documentation used by architects. |
| 02 | BI_BusinessPerformanceManagement.ppt Business_Intelligence.ppt | Business Performance Management summary, architecture, interfaces, systems and roadmap | Spain folder on teamroom. Existing Systems Documentation used by architects. |
| 03 | Billing_Arch.ppt Billing_satellites_interfaces.doc MMEDB Re-engineering.doc VF SP Interconnect Billing1.ppt | Summary and architecture of: PostPaid Billing, Mediation, TopUps, Billing Satellites, Sistema de Control CIFRAs, interconnection Architecture and Interfaces for the billing satellites | Spain folder on teamroom. Existing Systems Documentation used by architects. |
| 04 | Campaign_Management.ppt | Overview and high level | Spain folder on teamroom. |

| | | | |
|----|---|---|--|
| | | architecture of Campaign Management | Existing Systems Documentation used by architects. |
| 05 | CRM Arch baseline v22.ppt NCRM Presentation.ppt NCRM actualizada.doc CRM Functional view v2.3.xls & CRM Application view v2.3.xls | Detailed implementation and architecture of CRM: Core, Satellites and Call Centres | Spain folder on teamroom. Existing Systems Documentation used by architects. |
| 06 | EAI.ppt Tib.ppt midd.ppt EAI_TIBCO.zip | Overview of VF Spain EAI. Tibco inventory, etc. | Spain folder on teamroom. Existing Systems Documentation used by architects. |
| 07 | EIS_Arch.ppt EIS_Pocket_Arch.ppt | Technical architecture for EIS in production | Spain folder on teamroom. Existing Systems Documentation used by architects. |
| 08 | Finance systems_def.ppt | Global Strategic Review of the Finance Function | Spain folder on teamroom. Existing Systems Documentation used by architects. |
| 09 | IRIS_Arch.ppt | Architecture for IRIS – the Sales Force order entry system | Spain folder on teamroom. Existing Systems Documentation used by architects. |
| 10 | Web-Intranet.ppt | Overview of web and intranet | Spain folder on teamroom. Existing Systems Documentation used by architects. |
| 11 | Vodafone Global Application Landscape - SP v1.0.ppt | Package and description mapped to GITA areas of functionality. (Nov'05) | Spain folder on teamroom. Existing Systems Documentation used by architects. |
| 12 | Mapa v1.7.zip | Description of the applications, and their specific implementation, that fulfil each level 1 GITA domain. | Spain folder on teamroom. Existing Systems Documentation used by architects. |
| 13 | Consolidated OPCO Systems Inventory.xls | Consolidated Vendor and support organisation for areas of functionality across multiple OpCos | Across OpCos folder on teamroom. |
| 14 | Canal Online information | Information about the Canal Online project (FullSix virtual Shop and statistics) | Existing Systems Documentation used by architects. |

4 Billing

4.1 Overview

Both ARBOR and Infranet provide both Rating and Billing functionality. ARBOR is the key Billing application and forms the Core of Vodafone Spain's Billing system. Although Infranet has billing functionality in place, it is used basically to recurrent subscriptions. For postpaid, nevertheless, it must be have in mind that all charges created on Infranet regarding recurrent products are sent to ARBOR in which they are billed. Infranet does not create invoices by itself. Where Infranet is customisable (and has been customised heavily), ARBOR is not customisable and currently runs on version 11.8 of the product. The Rating functionality within ARBOR distributes out to 131 for usage statistics to give a credit limit amount, enabling calls to be cut off after a certain amount has been used. SMS is also interfaced with ARBOR to send messages informing that calls can no longer be made when usage limits are reached. ARBOR operates for post-paid customers only therefore all its interfaces are necessarily batch interfaces.

4.2 High-Level Architecture

The diagram below details the key systems within the Vodafone Spain Billing architecture. The core is Subscription Management with the two key billing applications being ARBOR and Infranet. From this core, a wide variety of satellite Billing satellites connect – all providing distinct pieces of functionality but none as critical to the overall Billing system as ARBOR and Infranet.

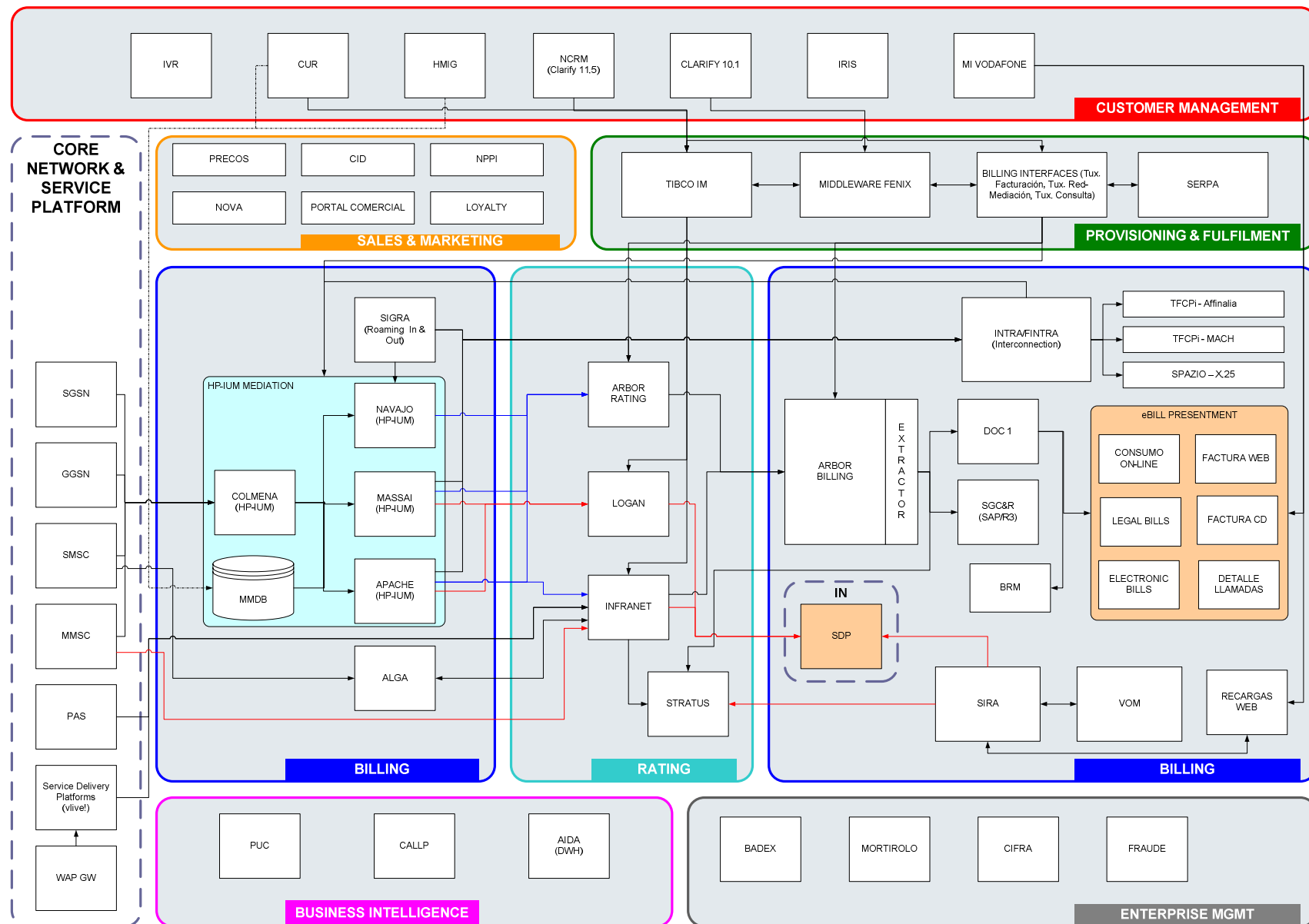


Figure 1 - Billing High Level Architecture

4.2.1 System Details

| System | Description |
|--|---|
| ARBOR | A Billing and Rating system that sits at the core of the Vodafone Billing System, handling Billing for post-paid customers - currently using version 11.8 of the product. |
| ALGA | Mediation system uses for SMS data. |
| DOC1 | A formatting system that sends output files in several formats to the printers (for physical bill mailing and other communications to be sent to the customer) and other applications for display onto the web or be viewed by the CSRs. The main formats produced are AFP, PDF, XML or TXT. |
| EXTRACTOR | A custom developed system for extracting the bill records from ARBOR and feeding them into various other systems that manage physical bill production. Its main purpose is extract billing data from ARBOR and prepare specific flat output files for the destination systems. It also gathers data from other sources (such as Loyalty, BRM, SAP or Campaign management). |
| Infranet | Based on Infranet 7.2 currently. Provides Rating and Billing functionality and is a system that sits at the core of the Billing platform alongside ARBOR. |
| BRM - Billing Rectification Management | Web application to manage and centralise the corrections on the bill taking into account the customer complaints. It allows amounts modifications and administrative corrections (addresses, data merge, etc). |
| eBill Presentment (Factura CD) | Factura CD gathers billing and customer data in order to distribute a CD application to those customers that have asked for it or want to manage their billing data. |
| eBill Presentment (Facturaweb) | Web application that allows corporate customers to search their billing data via the internet. It's possible to see the billing data splitting from several points of view, graphical analysis, export data to other formats (such as excel), etc. There is a separate web application for online view and analysis of customer's bills (individuals). The bills are archived in XML format and could be analyzed by customers using predefined views. |
| eBill Presentment (Online Consumption – Consumo Online) | Through On-line consumption application, both billed and non-billed consumption are displayed to the customers. Only Company administration can access to the application. They will be able to see all consumers (Mobile, GPRS, UMTS, etc.), services, etc. |
| eBill Presentment (Legal Bills) | Corporate customers can receive the invoice in an electronic format. Once this service is provisioned, the customer can download its invoice via the internet (as a link inside FacturaWeb). This document is considered to be the legal invoice, thus the customer isn't going to receive the invoice by letter anymore. The information is provided at account level and the customer is notified by SMS or email once the invoice is ready to be downloaded. |
| eBill Presentment (Electronic Bills – Factura electrónica) | It is the Electronic Bill System that is available in vodafone.es Portal inside My Vodafone. There are two implementations of this application to Customers and to Corporate. |
| eBill Presentment (Detalle Llamadas) | Pre-paid customers can visualize via web their calls done and the calls details. |

| System | Description |
|--|--|
| INTRA / FINTRA | INTRA and FINTRA are VF Spain's systems dedicated to the rating and billing process of incoming and outgoing interconnection calls with other Operators. INTRA: Rating and billing of interconnection traffic interchanged by VF Spain mobile with operators physically interconnected. It rates voice, SMS, MMS and WLAN with national operators, international carriers and international operators with direct interconnection, such as Vodafone Portugal. FINTRA: Rating and billing of interconnection voice traffic interchanged by VF Spain fixed with national operators and the SMS IW and MMS IW interchanged by VF Spain mobile with international operators. |
| HP-IUM (Colmena, Navajo, Massai & Apache) | A mediation system that interfaces with the network to feed usage information into the Billing systems. There are several HP-IUM instances depend on the kind of data that is being managed. Colmena is the central mediation system that distributes the mediation data to the other HP-IUM instances (Apache, Navajo & Massai). This other HP-IUM instances are connected to the MMDB: Colmena (Collections, Voice, SMS, etc.). Apache (GPRS/SMS). Navajo (Voice). Massai (MMS Premium). |
| MMDB (MEDDB) | MMEDB (or MMDB) cross cluster (Oracle) is allocated in Italy. It contains the promotion tables, Mi Pais tables, etc. In Italy, there are also the Batch processes for data, voice and SMS, managed by Apache, Navajo and Massai (HP/IUM). The MMEDB (Mediation Data Base) is re-engineering the standardization of the DB and the support to GPRS, MMS and related products in order to satisfy the real time mediation requirements. |
| SGCyR (SAP R/3) | System of Collections and Retrievals for Debt Collection Management, Payment Methods Management and Payment Management, done onto SAP R/3 platform. SGCyR (Sistema Gestión Cobros y Recobros – Collections and Recoveries Management System) covers a wide variety of functionality to do with payments. Banks are communicated with via an EDITRAN interface to record details of payments received. Customer Management systems are also interfaced with in order to manage payments – usually via FTP. Where a bad debt is understood to occur within the SGCyR module - after being tried the internal retrieval process (SMS, letters, PDS calls ...) without success – these data are sent to external Debt Collection Agencies for retrieval again. The debt collection agency will manage the recovery of the debt and take a commission for doing so. |
| SIGRA | SIGRA's main functions are: - collection of Roaming-In and Roaming-Out files, in TAP3 format - validation of name, structure and content of TAP3 file - aggregation for billing - sending of files to different entities: internal and external - re-sending of Roaming-In files when MACH requires - correction of Roaming-In file when it's incorrect at destiny - sending of files to opCos in test - sending data to SAP - daily sending to the DWH related to users, OpCos and rates - clearing of system files - reference data maintenance: OpCos, countries, currencies and users through the application GUI - sending of reports to Fraud, via fax and/or e-mail to the opCos. |
| Recargas Web | On-line web interface to top-ups for VF customer. |
| SIRA (Top-Ups) | SIRA is the system that handles top-up information. New credit is received from a variety of different systems and SIRA is the central system that manages how much credit a user currently has on their pre-pay phone. |
| SDP | SDP is the data store that holds the exact current amount of credit. SDP is the actual system that manages the current amount of credit – SIRA manages increases to that value of credit through top-ups, decreases to the amount of credit through actual usage are managed through Infranet connecting into SDP. |

| System | Description |
|---------|---|
| VOM | VOM is the Voucher Order Management system. SIRA interfaces with VOM in order to notify it when vouchers that have been issued are redeemed. |
| Stratus | STRATUS is another key Billing system that provides both Rating and Billing functionality – it is covered in detail within the Rating section of this document. |

4.2.2 Functional Coverage

GITA L2 functional implementation table:

| Function | Description | Implementation |
|-------------------------------------|--|---|
| Balance Management | SDP is used in pre-pay to manage the current credit available and ensure that there is notification of insufficient credit through to Rating. | SDP |
| Billing Auditing and Assurance | ARBOR and Conciliaciones share the data to ensure that all records received by ARBOR are eventually billed by ARBOR. | ARBOR 11.8 Conciliaciones |
| Customer Bill Production | ARBOR and Infranet work to produce the bill information. This can be presented to the customer in a variety of ways – EXTRACTOR takes the information out of the Billing systems for DOC1/Message 1 to enable production in a variety of ways. Factura CD takes this billing information to produce CDs for distribution, Facturaweb takes the information for display on the web. | ARBOR 11.8 DOC1 EXTRACTOR Infranet 7.2 Factura CD (Factura Offline) Facturaweb Electronic Bill (Factura electrónica) On-line Consumption (Consumo on-line) BRM Legal Bills Detalle Llamadas |
| Customer Discounts and Promotions | ARBOR manages the actual application of promotions or discounts onto bills during the rating process. | ARBOR 11.8 |
| Debt Collection Management | ARBOR sends the billing data to SGCyR which manages those bills that have been paid/unpaid and can be viewed via the Clarify instance. The SGCyR component of SAP manages collections and payments. SIRA is for pre-pay and manages Top-Up collections. | ARBOR 11.8 Clarify 10.1 SGCYR: System of Collections and Retrievals (SAP R/3) SIRA |
| Interconnect Billing and Settlement | All Interconnect Billing is handled by the two systems INTRA and FINTRA. The two mirror each other but handle different products and services. | INTRA / FINTRA |
| Partner Settlement | Most Partner revenue collection is handled through Stratus. See Rating section for more information. ARBOR also handles some Partner Settlement functionality whilst SAP handles | ARBOR 11.8 SAP A/P (SAP R/3) Stratus |

| Function | Description | Implementation |
|-------------------------------|--|--|
| | some of the settlement functionality. | |
| Payment Management | Payments are received into different systems. SIRA manages pre-pay payments, SGCyR manages other bill payments feeding through into Clarify 10.1 and ARBOR for Provisioning/Billing. | ARBOR 11.8 Clarify 10.1 SGCyR: System of Collections and Retrievals (SAP R/3) SIRA |
| Payment Methods Management | As above. | ARBOR 11.8 Clarify 10.1 SGCYR: System of Collections and Retrievals (SAP R/3) SIRA |
| Roaming Interoperator Billing | SIGRA is the main system for handling roaming billing – ARBOR is used to collect records for in-roamers into SIGRA. | ARBOR 11.8 SIGRA |
| Top-Up Management | SIRA manages pre-pay accounts. Other systems manage bill payment for post-paid accounts. | ARBOR 11.8 Clarify 10.1 SGCYR: System of Collections and Retrievals (SAP R/3) SIRA |
| Usage Record Handling | The mediation systems (IUM) manage the collection of CDRs off the network and distribute on to ARBOR. | HP-IUM (Colmena, Navajo, Massai & Apache) MMDB ARBOR 11.8 |
| Wholesale Billing | Wholesale operators buy bulk airtime from Vodafone for resale. No applicable system currently in place for handling this. | No system provided yet, although VF ES is assessing the technical alternatives and the cost impact to be ready due to MVNO business needs or Regulator's requirements. |

4.3 Key Interactions

| System | Interaction | Via | Notes |
|----------|--|---------------|--|
| Infranet | ARBOR | FTP | |
| Infranet | Stratus | FTP | |
| Infranet | CORAL | Others (FIPA) | Connection from Intranet on-line Data Manager to CORAL via FIPA (UDP) protocol |
| Infranet | TIBCO IM | Tibco (rv) | Connection from Intranet on-line Data Manager to Tibco |
| Infranet | BILLING INTERFACES (Tux. Facturación, Tux. Red-Mediación, Tux. Consulta) | Tuxedo | Connection from Intranet on-line Data Manager to Tuxedo |
| Infranet | NPPI | FTP | Batch files are sent via FTP. |
| Infranet | NPPI | Tibco (rv) | On-line connections via Tibco. |
| Infranet | DWH | FTP | |
| Infranet | CIFRA (Control System) | FTP | Using TCP/IP protocol |
| Infranet | LOGAN | Tibco (rv) | For inactivations |
| ALGA | Infranet | Tibco (rv) | |

| System | Interaction | Via | Notes |
|--|--|------------------------|---|
| ARBOR | CIFRA (Control System) | FTP | Using TCP/IP protocol |
| ARBOR | Clarify 10.1 | Tuxedo | |
| ARBOR | Middleware Fénix (Tuxedo Fenix) | Tuxedo | |
| ARBOR | BILLING INTERFACES (Tux. Facturación, Tux. Red-Mediación, Tux. Consulta) | Tuxedo | |
| ARBOR | DOC1 | FTP | Using TCP/IP protocol. (input flat data files) |
| ARBOR | Conciliaciones | FTP | Using TCP/IP protocol |
| ARBOR | Provisioning system (Clarify 10.1 + Middleware Fenix) | Tuxedo | |
| ARBOR | Apolo Provisioning system | Tibco (rv) /Tuxedo | |
| ARBOR | DWH (Aida) | FTP | |
| ARBOR | EXTRACTOR | Others (Sybase Client) | Using TCP/IP protocol (ARBOR sends data from BIPS module to Extractor) |
| ARBOR | ARBOR Roaming In | Others (Database) | |
| ARBOR | Infranet | FTP | Using TCP/IP protocol |
| ARBOR | MEDDB | FTP | Using TCP/IP protocol |
| DOC1 | SAP R/3 | FTP | input flat data files (collections, invoices and payments) |
| DOC1 | Loyalty Reward System | FTP | input flat data files (loyalty balance) |
| DOC1 | NPPI | FTP | input flat data files |
| DOC1 | CID (Commissions, Incentives and Distribution) | FTP | input flat data files |
| DOC1 | NCRM (Clarify 11.5) | FTP | input flat data files (CCM letters sent to customers) |
| DOC1 | Keyword (Palabra Clave) | FTP | input flat data files |
| DOC1 | Commercial Portal | FTP | Output flat data file sent to other systems |
| DOC1 | DWH (Aida) | FTP | Output flat data file sent to other systems |
| DOC1 | IXOS | FTP | Output flat data file sent to other systems |
| DOC1 | WAMA | FTP | Annual Summary batch info |
| BRM - Billing Rectification Management | Clarify 10.1 | Tuxedo /Tibco (rv) | Provisioning and update of the customer data. BRM picks up the customer data from Clarify 10.1. |
| BRM - Billing Rectification Management | DOC1 | FTP | Billing formatting |
| BRM - Billing Rectification Management | EXTRACTOR | FTP | BRM sends the customer's optimal price options to be included in its invoice |
| eBill Presentment (Factura CD) | Clarify 10.1 | Tuxedo /Tibco (rv) | Factura CD picks up the customer data from Clarify 10.1. |
| eBill Presentment | DOC1 | FTP | Billing formatting |

| System | Interaction | Via | Notes |
|--|---------------------------------|---------------------|--|
| (Factura CD) | | | |
| eBill Presentment (Factura CD) | EXTRACTOR | FTP | Extractor sends data to FacturaCD to be shown in that application |
| eBill Presentment (Factura CD) | (External Corporate) | FTP | To record the CD and send it to the customers. |
| eBill Presentment (Factura Web) | My Vodafone | WebServices (http) | Validation |
| eBill Presentment (Factura Web) | eBill Presentment (Legal Bills) | http | Link to Factura Legal application, that download legal invoice in electronic format |
| eBill Presentment (Factura Web) | Clarify 10.1 | Tuxedo /Tibco (rv) | Factura Web picks up the customer data from Clarify 10.1. |
| eBill Presentment (Factura Web) | DOC1 | FTP | Billing formatting |
| eBill Presentment (Factura Web) | NOVA | FTP | NOVA sent the relationship between MSISDNs and Spanish regions to Factura Web. |
| eBill Presentment (Factura Web) | DWH (Aida) | FTP | Factura Web sends information to DWH to later analysis. |
| eBill Presentment (Factura Web) | SAP (HR module) | FTP | Factura Web picks up the CECOs lists from SAP |
| eBill Presentment (Factura Web) | SGC | Tuxedo | Factura Web connects to SGC to the customer authentication. |
| eBill Presentment (Electronic Bills – Factura Electrónica) | Mi Vodafone | WebServices (http) | Validation |
| eBill Presentment (Electronic Bills – Factura Electrónica) | DOC1 | FTP | Billing formatting |
| eBill Presentment (Electronic Bills – Factura Electrónica) | SGC | Tuxedo | Eletronic Bills (Factura Electrónica) connects to SGC to the customer authentication. |
| eBill Presentment (Electronic Bills – Factura Electrónica) | Clarify 10.1 | Tuxedo /Tibco (rv) | Eletronic Bills (Factura Electrónica) picks up the customer data from Clarify 10.1. |
| eBill Presentment (Legal Bills) | DOC1 | FTP | Billing formatting |
| eBill Presentment (Legal Bills) | DWH (Aida) | FTP | Legal Bills sends information to DWH to later analysis and statistics. |
| eBill Presentment (Legal Bills) | Clarify 10.1 | Tuxedo /Tibco (rv) | Legal Bills informs to Clarify 10.1 and updates the customer information, activating this service in order the customer doesn't receive the bill in paper format any more. |
| eBill Presentment (Legal Bills) | Rivendel | Tibco (rv) | SMS Notifications to the customers.. |
| eBill Presentment (Legal Bills) | Emails platform | Tibco (rv) / Tuxedo | Email Notifications to the customers. |
| eBill Presentment (Legal Bills) | NCRM (Clarify 11.5) | Tibco (rv) / Tuxedo | The information of the notifications sent to the customers, is stored in NCRM. |
| eBill Presentment (Online-Consumption – Consumo Online) | Mi Vodafone | WebServices (http) | Validation |
| eBill Presentment (Online-Consumption – Consumo Online) | DOC1 | FTP | Billing formatting |

| System | Interaction | Via | Notes |
|---|--|--------------------|---|
| Consumption – Consumo Online) | | | |
| eBill Presentment (Online-Consumption – Consumo Online) | Clarify 10.1 | Tuxedo /Tibco (rv) | Online-Consumption (Consumo Online) picks up the customer data from Clarify 10.1. |
| EXTRACTOR | SAP R/3 | FTP | SAP sends information about the customer account status and its total balance for payments to Extractor. Besides, Extractor sends data to SAP. |
| EXTRACTOR | Campaign Management System (CMS) | FTP | Campaign Mgmt system sends the specific messages to be included in the invoice |
| EXTRACTOR | Loyalty Reward System | FTP | Loyalty System sends the customer's point balance to be included in its invoice |
| EXTRACTOR | DOC1 | FTP | DOC1 receives flat files from Extractor to format the invoices |
| EXTRACTOR | DWH (Aida) | FTP | Extractor sends output files with billing data to DWH |
| EXTRACTOR | CID | FTP | Extractor sends data to Commissions |
| EXTRACTOR | CIFRA | FTP | Cycle reports for Revenue Assurance |
| EXTRACTOR | Stratus | FTP | Fleet Management |
| HP/IUM (Colmena) | HP/IUM (Apache) | FTP | Colmena has not logic, it collects the GPRS/SMS information from the network and sends via FTP to Apache. |
| HP/IUM (Colmena) | HP/IUM (Massai) | FTP | it collects the MMS Premium information from the network and sends via FTP to Massai. |
| HP/IUM (Colmena) | HP/IUM (Navajo) | FTP | it collects the Voice information from the network and sends via FTP to Navajo. |
| MEDDB (or MMDB) | HP/IUM (Apache) | Others (JDBC) | |
| MEDDB (or MMDB) | HP/IUM (Massai) | Others (JDBC) | |
| MEDDB (or MMDB) | HP/IUM (Navajo) | Others (JDBC) | |
| MEDDB (or MMDB) | Clarify 10.1 | Middleware Fenix | Real postpaid provisioning subscriptions/products |
| MEDDB (or MMDB) | CUR | Tibco (rv) | CUR (Common User Repository) sends the user information to the MEDDB. |
| MEDDB (or MMDB) | Tibco IM | Tibco (rv) | Provision processes for pre-paid and postpaid subscriptions/products |
| MEDDB (or MMDB) | HMIG | Tibco (rv) | |
| MEDDB (or MMDB) | INTRA/FINTRA (interconnection) | Tibco (rv) | INTRA/FINTRA send the interconnection CDR files to INTRA and FINTRA. INTRA/FINTRA receive the numbering plan ranges associated to national operators. |
| MEDDB (or MMDB) | CIFRA (Control System) | FTP | |
| MEDDB (or MMDB) | BILLING INTERFACES (Tux. Facturación, Tux. | Tuxedo | |

| System | Interaction | Via | Notes |
|---|---|---------------------|---|
| | Red-Mediación, Tux. Consulta) | | |
| SGCyR (SAP R/3) (Debt collection system) | PDS | FTP | Predictive Dealer System (PDS). Outstanding calls |
| SGCyR (SAP R/3) | DOC1 | FTP | Billing Formating (Letters, etc.) |
| SGCyR (SAP R/3) | BADEX | FTP | Blacklist |
| SGCyR (SAP R/3) | ARBOR | FTP | Movements, Bills. |
| SGCyR (SAP R/3) | IVRs (IVR – MARC and SIVA, IVR – Ydilo) | Tibco (rv) /Tuxedo | Payments |
| SGCyR (SAP R/3) | SMS platform (SMSC) | Tibco (rv) | |
| SGCyR (SAP R/3) | CRM (Clarify 10.1) | Tibco (rv) | Provisioning. Bidirectional: Payment & debt info. |
| SGCyR (SAP R/3) | CRM (Clarify 10.1) | FTP | Provisioning: Request for suspension, reactivation, deactivation, etc. from Clarify 10.1 (Master Data) to SGCyR (SAP R/3) |
| SGCyR (SAP R/3) | NCRM (Clarify 11.5) | Tibco (rv) | Bidirectional: Data bank & debt info |
| SGCyR (SAP R/3) | NCRM (Clarify 11.5) | FTP | |
| SGCyR (SAP R/3) | DWH (Aida) | FTP | |
| SGCyR (SAP R/3) | Agency Collection | FTP | Assigning of outstanding bills |
| SGCyR (SAP R/3) | Banks | FTP | Payments returns |
| SGCyR (SAP R/3) | Card Payments | FTP | |
| HP/IUM (Apache) | Infranet | FTP | |
| HP/IUM (Massai) | LOGAN | FTP | |
| HP/IUM (Navajo) | ARBOR (Rating) | FTP | |
| SIGRA (Roaming In & Out) | HP/IUM (Navajo) | FTP | |
| SIGRA | INTRA/FINTRA (interconnection) | FTP | |
| SIGRA | ARBOR | FTP & Others (TAP3) | |
| SIGRA | SAP | Tibco (rv) | |
| SIGRA | DWH | FTP | |
| SIGRA | Fraud System (HP-FMS) | | |
| SIGRA | CIFRA (Control System) | FTP | Using TCP/IP protocol |
| INTRA/FINTRA (interconnection) | CIFRA (Control System) | FTP | Using TCP/IP protocol |
| INTRA/FINTRA (interconnection) | Clarify 10.1 | | |
| INTRA/FINTRA (interconnection) | TFCPi | FTP | |
| INTRA/FINTRA (interconnection) | SAP | FTP | |
| INTRA/FINTRA (interconnection) | Gagarin | | |
| SIRA (Top-Ups) | CUR | Tuxedo /Tibco (rv) | To obtain pre-paid customer information |
| SIRA (Top-Ups) | DWH (Aida) | FTP | |
| SIRA (Top-Ups) | Mortirolo (Fraud) | Tuxedo | Credit Card Fraud Control |
| SIRA (Top-Ups) | Clarify 10.1 | Tuxedo | |
| SIRA (Top-Ups) | NPPI | Tuxedo /Tibco (rv) | Promotions |
| SIRA (Top-Ups) | Stratus | FTP | |

| System | Interaction | Via | Notes |
|----------------|---|---------------------|---|
| SIRA (Top-Ups) | VOM | Tuxedo | Vouchers |
| SIRA (Top-Ups) | SDP | | |
| SIRA (Top-Ups) | IVRs (IVR – MARC and SIVA, IVR – Ydilo) | Tuxedo /Tibco (rv) | |
| SIRA (Top-Ups) | Recargas Web | Tuxedo | |
| SIRA (Top-Ups) | NCRM (Clarify 11.5) | Tuxedo /Tibco (rv) | |
| SIRA (Top-Ups) | INFRANET | Tuxedo /Tibco (rv) | |
| SIRA (Top-Ups) | Loyalty points calculation | FTP | To discount the points exchange for top ups. |
| SIRA (Top-Ups) | Loyalty rewards system | Tibco (rv) / Tuxedo | To exchange points for top ups. |
| SIRA (Top-Ups) | Banks & Retailers | Others (X.25) | Banks & Retailers connect to SIRA via X.25 to pay the top-ups. |
| VOM | CUPRA | Tuxedo | CUPRA is the web application to control prepaid vouchers. Then it connects to VOM via Tuxedo to get the vouchers information that VOM stores. |

4.4 Planned Changes and Known Architectural Issues

More detail is provided in the Rating section of this document but plans for Infranet changes include extending its Rating functionality in order to eventually decommission Logan (in-house development system for prepaid rating).

The upgrade, from Portal Infranet 6.5 to 7.2, was already taken in Q1 2006. This upgrade was only to change the Infranet core while keeping the customised functionality that has been developed with the last version (6.5). In a separate re-engineering project Vodafone Spain is trying to rationalise the use of customisations and assess where out-of-the-box functionality can be used but deployment will only take place, in several steps, after the core upgrade.

ARBOR was upgraded from version 10.0.8 to 11.8 in September 2006. This is for two reasons – the first is to provide further functionality which is key as the product is not customisable and the second is to extend the support contract. The terms of this support contract have been agreed and support is now scheduled to be provided until 2009.

Regarding MVNO implementation, VF ES is assessing the technical alternatives and the cost impact to be ready due to business needs or Regulator’s requirements.

SIRA changed in the summer of 2005 to increase both its performance and stability. The number of top-ups had increased by 30% requiring a change. The system was made more modular to improve stability but the core of the system did not really change.

Mortirolo (Fraud), VOM and SIRA will be unified in the new TopUps System. It is planned in the new Vodafone Spain Roadmap project.

Currently the MMEDB (or MMDB) cross cluster (Oracle) is allocated in Italy. It contains the promotion tables, Mi Pais tables, etc. In Italy, there are also the Batch processes for data, voice and SMS, managed by Apache, Navajo and Massai (HP/IUM).

The scope of this project is the MMEDB re-engineering. This means the standardization of the DB and the support to GPRS, MMS and related products in order to satisfy the real time mediation requirements.

5 Business Intelligence and MIS

5.1 Overview

The Business Intelligence and MIS architecture consists of one central Data Warehouse called DWH (The acronym AIDA is also used in conjunction with the Data Warehouse). DWH is a decentralized data warehouse; rather than comprising of one single data store, data is gathered in multiple Sybase and Sybase IQ databases based on the functional domain the data belongs to. Data can then be extracted using Views, which are controlled through Business Objects for the DWH.

This approach has evolved into the current architecture over the last 10 years, such that all systems within Vodafone Spain feed into this Data Warehouse. As the Data Warehouse consists of many stores, each system may feed several different physical databases.

Other tools exist within Vodafone Spain that serve Business Intelligence functionality for particular areas of business functionality. The Balanced Scorecard presents KPI information, NOVA analyses sales data to assist with customer retention whilst there are Segmentation Systems and Data Mining applications that use the central data for further detailed business intelligence.

5.2 High-Level Architecture

The diagram below details the overall architecture for the main Data Warehouse. The key point of note is the structure of the overall data warehouse. This comprises of several data marts that are divided into 2 tiers of information. The first tier structures the raw data from the various different systems into relevant groupings. There are eight Tier 1 data marts comprising of multiple Sybase databases in many cases. These Tier 1 data marts then repurpose the data into a further eight Tier 2 databases (Sybase again). These databases can then be queried to produce reports or pass information onto any of the other Business Intelligence systems.

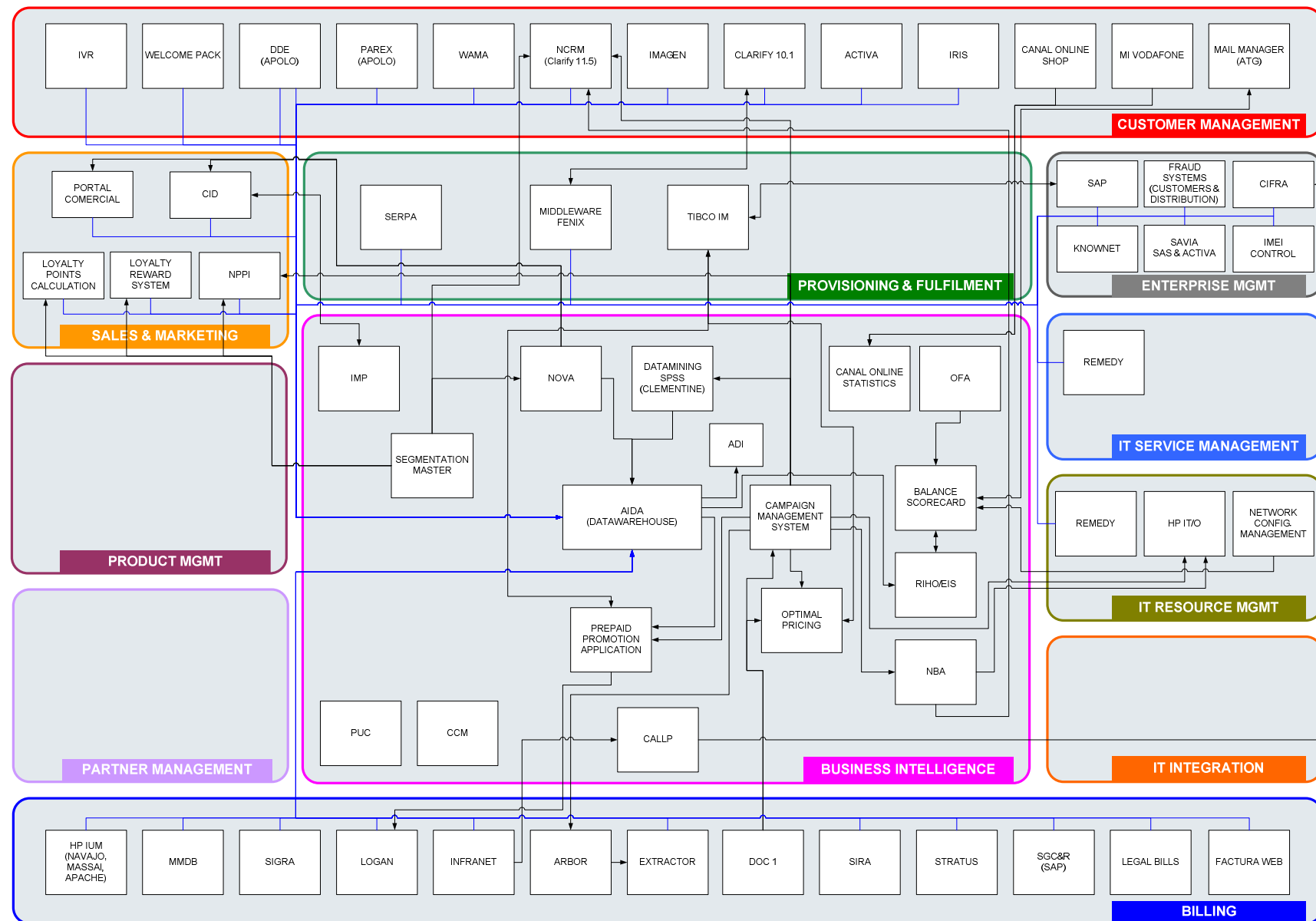


Figure 2 – BI & MIS High-Level Architecture

5.2.1 System Details

| System | Description |
|---|--|
| ADI | Report publishing system |
| Balanced Scorecard | Balanced Scorecard is the dashboard that provides KPI information to senior executives. Interfacing with RIHO to gather the definitions and values of the KPIs, the Balanced Scorecard is accessible via Web, PDA and Blackberry and provides an analysed view of data held within various datamarts. |
| BO | Business Objects. Tool for providing views on the data within the DWH. Currently using the Business Objects Client but this is scheduled to be upgraded to the Business Objects Web Client (using WEBI) . |
| CALLP | Application that stores the calls done by our customers. |
| Campaign Management System | Based on the Affinium package from Unica, the Campaign Management System takes feeds in from Data Warehouse and uses it to identify customers eligible for campaigns. The system provides details on responders, conversions, costs and campaign effectiveness. |
| Canal Online - Statistics | Web Statistics project is part of the Online Proposition project. It provides a statistics platform for the Online Channel applications. Customer usage in the internet applications is recorded and analyzed in a web statistics service provided by SiteCatalyst (outsourced model). |
| Datamining application (Clementine) -SPSS | Provided by SPSS, this platform is used as a tool for data mining that allows the development of predictive models using the business knowledge and applying it inside the operations in order to improve the making-decisions process. And SPSS is the tool (of SPSS Company) for data mining and data analysis |
| DWH (Aida) | Data WareHouse. Also known by the acronym AIDA. |
| EIS/RIHO Database | RIHO is the datamart that holds KPI information, aggregated and detailed data. The only logic within the datamart is the way of calculating KPIs. RIHO contains information about the KPI – what it is, where it came from, how it is calculated, etc. |
| IMP | Integrated Marketing Plan. Decision support system for BSC (Balanced Score Card) in Web, PDA and BlackBerry dashboard. |
| Next Best Activity (NBA) | For further information see Customer Management. NBA system, by the moment, is actually an in-house development. The NBA system covers the "Campaign Execution" domain rather than Campaign Analysis. The NBA system interfaces in real-time with the Clarify instance (NCRM) in order to present offers through to customers. As a customer calls the contact centre, Clarify passes the customer details into NBA. NBA then uses various segmentation data and customer data to understand which promotions would be best targeted to that customer and represents them as a graphic on the Clarify UI. Where the CSR sees fit, they can view the NBA data direct within Clarify and attempt to cross-sell to the customer. NBA offers to the customer what is instructed to offer, there is no analysis performed within the system. Such analysis is undertaken by several means and one of them is UNICA, but not the only one. It is planned that the new Global solution based on e.Piphany will be adopted by VF-SP in the near future. |
| NOVA | NOVA is a system that assesses Customer Performance and is used by Sales Force to manage their part of the customers depending on criteria defined by the business. It looks at details for current customers in order to see what ways Vodafone can increase the number of subscriptions. It looks at what customers do in order to help avoid churn – understanding the best areas of the customer base to target particular promotions and campaigns. |

| System | Description |
|--------------------------------------|---|
| OCM | The goal of this system is to centralize in an application marketing campaigns management in order to serve as a basis to automate tasks that currently are carried out manually. |
| OFA | Tool for budgeting, finance analysis reporting and forecasting. |
| Optimal Pricing | This application selects the best/cheapest price plan for the customer/corporate (on line and batch). |
| Prepaid Promotions Application (PPA) | In-House developed, this application manages prepaid promotions and chooses the target customers of each promotion launched. Data files are sent to the applications used to offer them to customers. Interface systems send to PPA the data needed to know the final result of the applied promotions. |
| PUC | Prepaid use control |
| Segmentation Master | In-House developed, this database model provides the customer information divided into the categories defined by the business in order to be analyzed whenever required. |

5.2.2 Functional Coverage

GITA L2 functional implementation table:

| Function | Description | Implementation |
|--|--|---|
| Advertising Analysis | Analysis of advertising campaigns in order to planning future campaigns is handled through Campaign Management System which is based on a product from Unica. | Campaign Management System |
| Business Intelligence Data Management | Central Data Warehouse manages this Business Intelligence. | DWH (AIDA) Canal Online Statistics |
| Business Performance Reporting and Analysis | Central Data Warehouse manages this Business Intelligence with the BSC handling the presentation tier. | DWH (AIDA) Balanced Scorecard |
| Campaign Analysis | Campaign Analysis is performed by two systems. Campaign Management System handles the distribution of most Campaigns and then interfaces with CRM solutions to track its success. NBA uses analysis to target specific promotions at specific customers through the CRM solutions. | Campaign Management System Next Best Activity (NBA) OCM |
| Corporate Performance Reporting and Analysis | Central Data Warehouse manages this Business Intelligence with the ADI handling the presentation tier. | DWH (AIDA) ADI |
| Customer Profiling and Segmentation | All customer segmentation is handled through the Segmentation Master system. | Segmentation Master CALLP |
| Customer Satisfaction Analysis | Extracted from various CRM solutions in the Data Warehouse. | DWH (AIDA) |
| Decision Support | The presenting of KPIs is handled through the Balanced Scorecard. Balanced Scorecard uses the RIHO Database to understand key KPI information and OFA for the current data to report on. | Balanced Scorecard EIS/RIHO Database OFA Canal Online Statistics |
| Legal Reporting | Extracted from various systems into the Data Warehouse. | DWH (AIDA) |

| Function | Description | Implementation |
|-------------------------------------|--|--|
| Loyalty Performance Analysis | The Datamining application from SPSS Clementine and the Campaign Management System both assess the data within the DWH for Loyalty performance. | Datamining application Campaign Management System |
| Market and Competitor Analysis | The Datamining application from SPSS Clementine manages the market analysis through searching for patterns with the DWH. | Datamining application |
| Price Plan Analysis | Central Data Warehouse manages this Business Intelligence. | DWH (AIDA) Optimal Pricing |
| Product Performance Analysis | Central Data Warehouse manages this Business Intelligence together with Business Objects providing the front-end view. | Datamining application DWH BO PUC |
| Promotion Analysis | NOVA is the system that handles customer performance to help prevent churn through seeing where best to offer promotions. | NOVA, DWH (AIDA) |
| Sales Analysis | NOVA is the system that handles customer performance to help prevent churn through seeing where best to offer promotions. | NOVA, DWH (AIDA) |
| Supply Chain Analysis and Reporting | The Supply Chain Analysis and Reporting sub-domain collects information from ERP related to the supply process and provides KPIs to measure productivity, effectiveness and economics of the company's supply structure. No system currently performs this function. | No System Provided |

5.3 Key Interactions

The table below attempts to list some of the key interactions. It is not an exhaustive list but only represents a sample those key points of interface between various systems (Datawarehouse, in fact, interfaces with most systems, platforms, products, services, network devices, etc.)

| System | Interaction | Via | Notes |
|----------------------------|-----------------------|------------------|--------------------|
| ADI | DWH | FTP | |
| Balanced ScoreCard (BSC) | DWH | FTP | |
| BSC | CID | FTP | |
| BSC | HP IT/O | FTP | |
| BSC | Mails Manager (ATG) | FTP | |
| BSC | Network Configuration | FTP | |
| BSC | Portability System | FTP | |
| BSC | OFA | FTP | |
| BSC | Remedy | FTP | |
| BSC | SAP | FTP | |
| BSC | SAVIA SAS & ACTIVA | FTP | |
| BSC | RIHO (EIS) | Others (JDBC) | |
| Campaign Management System | DWH | Others (DB Link) | Interface into CMS |

| System | Interaction | Via | Notes |
|---|--|------------------|----------------------|
| Campaign Management System | DWH | Others (DB Link) | Interface into CMS |
| Campaign Management System | DOC1 | FTP (Batch job) | Interface into CMS |
| Campaign Management System | ARBOR | FTP (Batch job) | Interface out of CMS |
| Campaign Management System | Loyalty Rewards System (Puntos) | FTP (Batch job) | Interface out of CMS |
| Campaign Management System | NBA | FTP (Batch job) | Interface out of CMS |
| Campaign Management System | NCRM (Clarify 11.5) | FTP (Batch job) | Interface out of CMS |
| Campaign Management System | Datamining application (Clementine) | FTP (Batch job) | Interface out of CMS |
| Campaign Management System | NPPI | FTP (Batch job) | Interface out of CMS |
| Campaign Management System | Optimal Pricing | FTP (Batch job) | Interface out of CMS |
| Campaign Management System | Hulk | FTP (Batch job) | Interface out of CMS |
| Campaign Management System | HP-IT/O (monitoring) | Others (SNMP) | Interface out of CMS |
| Datamining application (Clementine) | DWH | FTP | |
| Datamining application (Clementine) | NCRM (Clarify 11.5) | FTP | |
| DWH | LOGAN | Others (ETL) | Load into the DWH |
| DWH | Equinox | Others (ETL) | Load into the DWH |
| DWH | IRIS | Others (ETL) | Load into the DWH |
| DWH | SAP | Others (ETL) | Load into the DWH |
| DWH | SIGRA | Others (ETL) | Load into the DWH |
| DWH | ARBOR | Others (ETL) | Load into the DWH |
| DWH | CID (Commissions, Incentives & Distribution) | Others (ETL) | Load into the DWH |
| DWH | Clarify 10.1 | Others (ETL) | Load into the DWH |
| DWH | NCRM (Clarify 11.5) | Others (ETL) | Load into the DWH |
| DWH | Serpa | Others (ETL) | Load into the DWH |
| ...plus many other systems load data into the DWH | | | |
| DWH | Segmentation Master | Others (DB Link) | Load out of the DWH |
| DWH | Campaign Management System | Others (DB Link) | Load out of the DWH |
| DWH | Loyalty points calculation | FTP | |
| DWH | Fraud accounts control (CONCUFRA) | FTP | |

| System | Interaction | Via | Notes |
|--|---|--------------------|--|
| DWH | Distribution Sales Force Fraud System (HPFMS) | FTP | |
| DWH | RIHO (EIS) | FTP | |
| DWH | SAVIA SAS & ACTIVA | FTP | |
| DWH | Network configuration management | FTP | Two-ways |
| DWH | Rainbow | FTP | Two-ways |
| DWH | Pera OnLine (POL) | FTP | Two-ways |
| ...plus many other systems load data into the DWH | | | |
| Canal Online Statistics | Vodafone.es | HTTPS | Records pages visited by the customer |
| Canal Online Statistics | Canal Online Shop | HTTPS | Records pages visited by the customer |
| Callp | CIFRA | Others | |
| IMP | CID | FTP | |
| NBA Key interactions are described in the Customer Management Chapter. | | | |
| NOVA Key interactions are described in the Sales & Marketing Chapter. | | | |
| OFA Key interactions are described in the Enterprise Management Chapter. | | | |
| Optimal Pricing | DOC1 | FTP | Billing formatting |
| Optimal Pricing | Campaign Management System (CMS) | FTP | CMS sends a batch file with the customers list to calculate their Optimal Pricing. |
| Optimal Pricing | DWH (Aida) | FTP | Analysis purposes. |
| Prepaid promotions app | Apolo Pre-paid | Tibco (rv)-CDM | |
| Prepaid promotions app | Campaign System | FTP | |
| Prepaid promotions app | Clarify 10.1 | FTP | |
| Prepaid promotions app | Equinox (Qtal) | FTP | |
| Prepaid promotions app | LOGAN | FTP | |
| Prepaid promotions app | SAP | FTP | |
| Prepaid promotions app | TIBCO IM | Tibco | |
| Segmentation Master | DWH (Aida) | FTP | |
| Segmentation Master | HP-IT/O (monitoring) | FTP | |
| Segmentation Master | Loyalty rewards system | Tuxedo /Tibco (rv) | |
| Segmentation Master | NOVA | Tuxedo | |
| Segmentation Master | SAP (SCM Module) | Tuxedo /Tibco (rv) | |
| Segmentation Master | SAT (SAP R/3) | Tuxedo /Tibco (rv) | |
| Segmentation Master | DWH (Aida) | FTP | |
| Segmentation Master | WAMA | FTP | |

5.4 Planned Changes and Known Architectural Issues

DWH (AIDA) - The current implementation has evolved into the architecture that it is today rather than follow a strategic direction.

The reasons for this evolution are a combination of factors. The choice of Sybase as a database limited the volume of data that could be stored there. Organisationally, it was decided that the responsibility for the ETL layer should reside with the Operational Systems providing the data. As a result it was simpler to increase the amount of databases as new systems were introduced rather than merge into one single Enterprise Data Warehouse.

Current Datawarehouse will be rehosted in a new environment, based on Teradata Technology, located in Ratingen. This project has been already planned and has been started up.

NOVA (application replacing TOP3000) covers the GITA Sales Management domain. It is a web application that provides customer information divided into the categories defined by the business in order to be analyzed whenever required to provide the best services and products to Vodafone Customers. It is used by the Sales Force Channel.

Balanced Scorecard (BSC) - The Balanced Scorecard is simply a presentation view on a set of data. Currently the web presentational element is handled by Dynasight and the mobile presentational element for PDAs and Blackberry's is handled via BEA WebLogic Server 7.0.

NBA platform will evolve to a new platform, supported by Epiphany, a commercial product selected by Vodafone Group and Vodafone Spain for these purposes. Vodafone UK and Hungary has already implemented this commercial product for this functionality. Epiphany will be implemented in the next months and there will be capabilities of Real Time Marketing and “proppension and behaviour” modelling for offering the best actions at the best moment to the customers or subscribers.

6 Customer Management

6.1 Overview

The core of Customer Management is handled by two Amdocs - Clarify systems – one is version 10.1 and the most recent implementation is in 11.5 and is known as NCRM – New CRM.

Clarify 10.1 handles post-paid provisioning and it is the master repository for post-paid customer information. NCRM handles Customer Contact Management and is the master repository for pre-paid customer information. The Apollo program introduced a new front-end based on Clarify 11.5 consoles, for pre-paid provisioning integrating with the back-end of Clarify 10.1 and others masters repositories through TIBCO.

Clarify 10.1 is the master system for post-paid customers, post-paid customer accounts, post-paid services, VF numeration (pre&post-paid), pre-activation (pre&post-paid), post-paid products catalogue, several supplementary services, several restrictions and discounts.

NCRM enables a single unified view of customer data on one screen and tightens integration between existing front-end applications and back-end systems. Other main targets are to reduce the number of tools the CSRs use for solving the customer's requests and reduce de AHT (Average Holding Time: it is the mean time invested from a call appears in a concrete CSR queue to that call finishes completely and the CSR is ready to attend a new call).

NCRM – Provision Integration for Prepaid customers (October 2005). Integration of NCRM with the Provisioning Systems for Prepaid customers facilitates CSRs' work by allowing them to manage a full customer contact, from the interaction classification and storage to the execution of the required provision order. In fact, NCRM provision integration is a reality for pre-paid provision and other main products provision (such as Summer/Christmas campaigns).

NCRM – Fax integration (March 2006). It is full fax integration which:

- Allow the capture of incoming faxes, its delivery and displaying by the agents in an integrated way to the NCRM
- Makes feasible fax sending directly from the NCRM using predefined templates
- A new workflow object has to be created (Action item) and included to link every fax to it. As Action Item is a standard clarify object, there are no functional changes in the existing functionality

The main channels concerning Customer Contact Management are: voice (traditional customer care with CSRs managing inbound & outbound calls), IVR (requests answer based on voice recognition and automation processes) and online (based on contacts via the Internet). Sales Channel is also an important point of contact for VF-ES customers, and day by day there are more tasks related to customer care done by the salespeople.

GAE is the new system for managing corporate customer keys. It was launched in November 2006.

Contact Centres architecture is currently under a re-engineering process (a project called POLVO), which will allow to simplify them in order to be more robust and extensible in addition to offer new features like VoIP.

VF-ES online channel is currently in a re-engineering process. This project considers eSales, eServices and the operational tools specific for the channel.

eSales capabilities are provided by an ASP based solution (FulSix+Indra) integrated with VF-ES backend systems through Tibco and Tuxedo services.

eServices (My Vodafone) is nowadays an in-house development based on Bea WebLogic and backend integration through Tibco/Tuxedo, but it's going to be replace for a temporal ASP based solution..

6.2 High-Level Architecture

The diagram below details the Customer Contact Management High Level Architecture. The various different channels appear across the top with the Core NCRM (Clarify 11.5) and Clarify 10.1 systems appearing in the centre surrounded by the various CRM satellites.

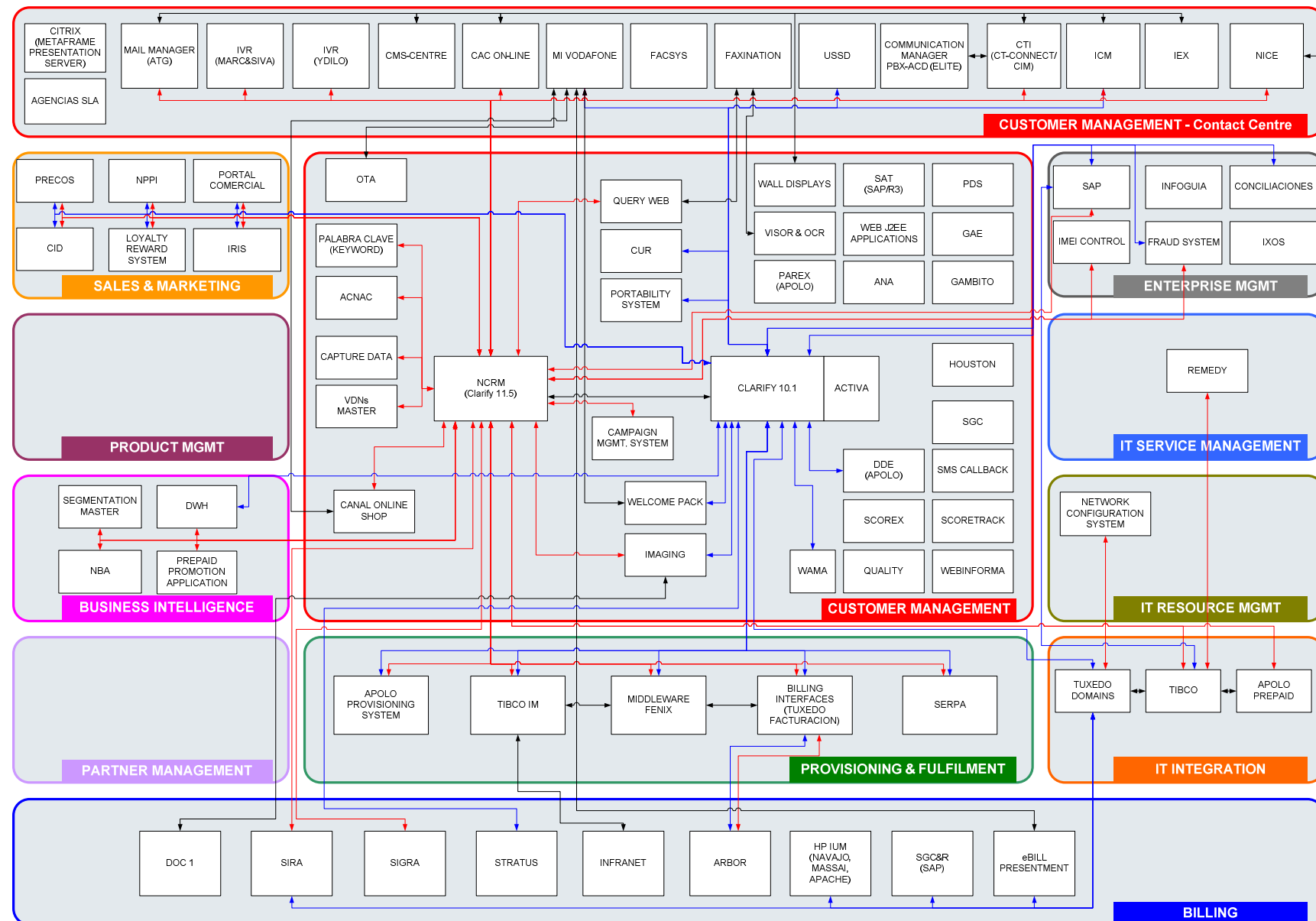


Figure 3 - Customer Management High Level Architecture

6.2.1 System Details

| System | Description |
|--------------------------|--|
| IEX | Work Force Management application that organises customer care human resources platforms. It receives information about calls, agents, states, etc. and assigns vacations, breaks, turns, performs predictions using both, the existing real time and historical information and other parameters introduced by supervisors. |
| ICM | Intelligent routing system based in algorithms calculated using agents' time and states, customer segmentation criteria, customer service levels. The ICM also provides MSISDNs for surveys. |
| NICE | NICE is an application for recording the interactions of the call centre with the final customers at different levels: voice, screen, voice and screen and for inbound and outbound calls and e-mails. Thus, the current triggers for recording are Calls and e-mails. The recordings may have associated the “evaluation” information provided by the different supervisors. |
| SMS Callback | A call centre application that allows the bulk distribution of SMS to customer mobiles. |
| Mails Manager (ATG) | Mails Manager (ATG) is an e-mail routing platform. It collects all incoming e-mails from Vodafone customers and analyses their contents. Based on them, it routes and delivers to specific contact centre platforms. It monitors each e-mail response SLA and assigns priorities in the queues. The system opens the customer's details from Clarify 11.5 automatically, based on the e-mail address. It generates detailed statistics per CSR, team, platform, etc. |
| NCRM (Clarify 11.5) | NCRM is the workflow and customer interaction management system. It's mainly based on Amdocs Clarify 11.5. NCRM enables a single unified view of customer data on one screen and tightens integration between existing front-end applications and back-end systems. |
| ACNAC | NCRM contingency application |
| CMS-Centre Vu | It collects the information from PBXs for storing a calls historic and analysing them to get information about the number of calls and SLAs. |
| Canal Online - Shop | (The application is outsourced in FullSix facilities). The Online Shop-FullSix (Online Shops) is a Internet sales channel of Vodafone Spain, across which, the customers will be able to buy, of a comfortable, rapid and sure way, technological devices of last generation. |
| PDS | Predictive dialer system and application to generate automatic outbound call campaigns using voice infrastructure. The calls are generated through a predictive dialer that uses input specific information to generate the different calls. The input information comes via plain files and ftp. |
| ANA | Application to provide direct access to the HLR for specific and restricted operations, for example roaming failures corrections. The different profiles may have only query permissions or update permissions. |
| OTA | Application to allow the configuration of the Vodafone Live terminals. The call centre agent or the final customer (through “My Vodafone”) may configure the terminal using the application and a command is sent to the terminal itself to update the proper configuration. |
| Next Best Activity (NBA) | Next Best Activity executes customer marketing offers by interfacing with NCRM in order to allow Customer Service Agents to sell products and services through the Call Centres. NBA appears as an option within NCRM. |
| Clarify 10.1 | Application to manage post-paid customers, the services and the provision orders towards the provision system and the network. It also performs sim card and numbering plan management. |

| System | Description |
|---|--|
| Communication Manager (PBX)-ACD (Elite) | <p>Automatic Call Distribution (ACD) system definition: This is the term for equipment that is employed to distribute telephone calls between a group or groups of answering agents. It may be an inherent part of a PABX or an add-on system. ACD is used extensively in contact centre environments.</p> <p>Private Branch Exchange (PBX) systems definition: This is an in-house telephone switching system that interconnects telephone extensions with the outside telephone network. It may include functions such as least cost routing for outside calls, call forwarding, conference calling and call accounting.</p> |
| WAMA | WAMA is the new web application that supports the VF-SP post-sales model. It could be used for both residential and corporate customers. It manages handset repairing and replacement lifecycle and SIM card change. Customer's segmentation integration allows a tailored treatment for each customer. The system is also integrated with handset manufacturers and the logistic operators systems. |
| ACTIVA (Clarify 10.1) | Application based in Clarify 10.1 dedicated to the postpaid activation process – it deals with incoming portability in terms of activating new customers. |
| Keyword (Palabra Clave) | It allows the identification of the Vodafone customers through the generation, storage and management of a password (keyword) assigned to the customer. |
| CAC On-line | Application to provide on-line periodical reports (maximum 30 minutes old) about the on-line metrics of the different existing channels in the Customer Contact Centre. |
| CTI | <p>This system provides Computer-Telephony integration. As part of such integration, the <i>softphone</i> functionality is made available to the CSR via The Toolbar which</p> <p>Página: 31</p> <p>is an in-house development that allows CTI integration with NCRM among other integrations (such as NCRM with Clarify 10.1 or single sign-on in web applications). Relevant CTI features are those related to transfer calls but also those concerning the management of inbound and outbound calls. The integration with NCRM allows CSRs to deal with the call without physical telephones.</p> <p>Relevant features are: one or two steps transfer, human to machine transfer and attached data in the transfer.</p> |
| Imagen (Imaging) | <p>Application to provide storage and dynamic access to a great volume of documents (bills, contracts, Loyalty points extracts, Commissions, Call Center documents, Collections letters, etc.). It comes with groupware and workflow functionalities to allow the proper document capture, visualisation, workflow application and storage. One of the main workflows implemented is the activation workflow for postpaid customers.</p> <p>Imaging will be decommissioned when NCRM manages all faxes. Now other documents stored in IXOS are being consulted by Query Web in the case of CSRs and Electronic Bill / Factura Web / etc for customers via My Vodafone.</p> |
| Citrix Metaframe XP | It is for application virtualization using a centralized and secure architecture. Citrix Metaframe XP enables IT to centrally deploy and manage line of business applications while providing secure, on-demand access to these resources for users anywhere, on any device and any network. |
| DDE (Apolo) | DDE (In House Development) stores the history of the prepaid deactivated customers/services. |
| Parex (Apolo) | <p>PAREX (In House Development) stores a copy of:</p> <ul style="list-style-type: none"> - HLR Pre-paid customer profile, - Commissioning control codes, - Allowing real-time requests from customer care channels. |
| FACSys | FACSys 4.7 is implanted in Vodafone Spain in order to absorb massive faxes sending and reception. The use of this product generates faxes coming from Office applications and requests about registers, resigns and modifications of customer's contracts. |
| Faxination | Fax system include in GD project |

| System | Description |
|---------------------|--|
| GAE | Authorized of Corporates Management System . It realizes the following actions: <ul style="list-style-type: none"> - User validation (NIF). - Recover authorized list. - Password Change - Alternative security policies - Create / Remove of authorized objects. - Create / Remove / Modify and Query of authorized groups and lines groups. - Delegation hierarchy inquiry |
| Houston | The purpose of this application is the flash SMS (class 0) sending by Customer Service Helpdesk and Distributed Systems teams notifying the begin, evolution and end of a general incidence or any other announcement interesting for Customer Management and related with technical intervention. |
| IVR - MARC and SIVA | It interacts with customer. If this system cannot solve a customer's call, this is transferred to an agent through CTConnect. Currently, SIVA offers services for Customers Management plus MARC service. It is included IVR-SLS (as well over Siatvox). SIVA is an IVR which offers Call centre and marketing services automatisation through the use of virtual agents and DTMF: top-ups, usage queries, prepaid services...Marketing campaigns through outbound calls offering the final customer information about promotions, customer satisfaction surveys, etc. |
| IVR - Ydilo | It interacts with customer. If this system cannot solve a customer's call, this is transferred to an agent through CTConnect. Currently, Ydilo offers services for Customers Management. YDILO is an IVR which offers call centre services automatisation through the use of voice recognition systems: retention customer services, customer care for residential customers, customer satisfaction surveys (outbound), etc. |
| My Vodafone | My Vodafone is the Vodafone Spain Internet Portal in vodafone.es to auto-provisioning, auto-information, on-line shop, self care etc, where the pre-paid customers, post-paid customers and corporate have available a lot of on-line services. |
| PBX-ACD | <p>Private Branch Exchange (PBX) systems definition: This is an in-house telephone switching system that interconnects telephone extensions with the outside telephone network. It may include functions such as least cost routing for outside calls, call forwarding, conference calling and call accounting.</p> <p>Automatic Call Distribution (ACD) system definition: This is the term for equipment that is employed to distribute telephone calls between a group or groups of answering agents. It may be an inherent part of a PABX or an add-on system. ACD is used extensively in contact centre environments.</p> <p>PBX-ACD Atocha 1, Atocha 2, Castellana Norte, Fuencarral, Gava, Heron, Hospitalet, Poble Nou, SS Reyes, Toledo, Valladolid 1</p> |
| Portability System | It is used to process portability requests by customers either leaving or joining Vodafone Spain. |
| Quality | Application for managing auditing reports of distributors. This allows to execute claims and publish the reached aim. |
| Query web | QueryWeb is a system for retrieving the information stored in Imaging system. It is a three-level application that access to Imaging system and Ixos using Tuxedo in order to retrieve all the required information. |
| Scorex | It scores the request for activation, on-line. It's the Credit Scoring System. According to this scoring, the activation process will go on as the established procedure. |
| SGC | Keys Management System (Sistema Gestión de Claves) |
| VDNs Master | System that stores the information about VDNs (Virtual Directory Number) used in call centres. VDNs are internal numbers in call centres and customers calls are distributed between them. |

| System | Description |
|----------------------------|--|
| Visor and OCR | Visor: Tool to watch ixos images. SPICR: OCR System. It is used to extract data from incoming faxes. |
| Wall Displays | It is a package provided by Symon and it is a system that manages the wall displays that show information about calls queue at real time in the Call Centres. |
| Webinforma | Web application to allow queries by address and name into the INFORMA system |
| SAT (SAP R/3) | Post- sales service |
| Scotrack | It scores the customers depending on their oficial defaulting data |
| Welcome Pack | Web application to capture personal and demographic data through the use of promotions and vouchers. There are 2 welcome packs, one for prepayment and another one for postpayment. The application is accessed from different interfaces and systems, including the call center agents. |
| Campaign Management System | Recive data from Datawarehouse and uses it to identify customers eligible for campaigns. The system provides details on responders, conversions, costs and campaign effectiveness |
| Web J2EE Apps | Intranet, internet, Cac and extranet applications based on J2EE architecture (mainly over a Weblogic Application Server). They are oriented to customers (in vodafone.es), sales force (commercial portal, etc.), CaC and Employees (departements / groups or the whole company such as the local people finder, etc.) |
| CUR | CUR (IHD) stores: <ul style="list-style-type: none"> - Pre-paid customer profile, products and service data, allowing real-time requests to provide personalised services - Stores the information to allow the prepaid services lifecycle. - Stores the on-line customer device information. |

6.2.2 Functional Coverage

The Customer Management domain supports a number of functions for the business.

GITA L2 functional implementation table:

| Function | Description | Implementation |
|----------------------------|--|--|
| CM Resource Management | The CM Resource Management sub-domain handles both human and technology resources. It includes the functions required to manage Customer Contact Centres | CAC on-line IEX Wall Displays |
| Contact Channel Management | The Contact Channel Management sub-domain is responsible for managing customer contact via multiple customer contact points over multiple channels, such as a live call (i.e. with a customer service representative), IVR, CTI, Web, SMS, e-mail, etc.. | Mails Manager (ATG) CMS-Centre Vu Communication Manager 2.2- ACD Elite 12.0 CTI (Ct-connect/CIM) Facsys Faxination ICM IEX IVR - SIVA My Vodafone GAE NCRM Next Best Activity NICE (NICE v8.80.06) PDS (PDS v12) SMS Callback IVR - Ydilo |

| Function | Description | Implementation |
|--------------------------------|---|---|
| Customer Contact Management | The Customer Contact Management sub-domain is responsible for capturing customer requests and needs as manifested within the context of one or more interactions with Vodafone and for initiating internally driven communications with the customer. | ACNAC Facsys Factura electrónica (Electronic Bill) Faxination IVR - SIVA My Vodafone NCRM On-line Consumption PDS Portability System Query web WAMA (Post-sales Service System) Weblogic Welcome Pack IVR - Ydilo SAT (SAP R/3) |
| Customer Document Management | Manages the electronic documentation related to the customer (bill images, subscription form, proposal..). It includes as main functionalities: document acquisition, image storage on different potential media, flexible and intelligent document indexing and document retrieval upon request. | Imagen Query web NCRM + IXOS |
| Customer Incentives Management | The Customer Incentives Management sub-domain covers the ability to offer incentives tailored to specific customers. These incentives are known as NBA (Next Best Activity) or Real Time Marketing and can be defined as in-bound campaigns, to be proposed to the customer as a part of a contact. For example, they could be an offering to try to increase usage, up-sell, cross-sell or to prevent churn. | Loyalty rewards system Next Best Activity |
| Customer Profile Management | The Customer Profile Management sub-domain is responsible for the management of the customer's personal and contractual information. | Apolo DDE Apolo Parex Clarify 10.1 NCRM (Clarify 11.5) CUR |
| Order Capture and Validation | The Order Capture and Validation sub-domain is responsible for capturing and validating orders for Vodafone products and services from customers. | Activa (Clarify 10.1) ANA Clarify 10.1 IRIS My Vodafone NCRM - Consoles On-line stores (Online channel) Loyalty rewards system OTA |

| Function | Description | Implementation |
|----------------------------|--|---|
| Risk and Credit Management | Scorex and BADEX both provide credit checking facilities for new customers. | Scorex Webinforma |
| SLA and Quality Management | The SLA and Quality Management sub-domain manages the service level agreement and service quality promises made to the customer as part of their contract or agreement with the company. | NCRM |
| Trouble Management | The Trouble Management sub-domain covers the functions required to respond to problems communicated by the customer to the Customer Contact Management sub-domain. | Houston NCRM Remedy SMS Callback |

6.3 Key Interactions

| System | Interaction | Via | Notes |
|---------------------|--|------------------------------|--|
| MAILS MANAGER (ATG) | Clarify 10.1 | Others | CORBA (maybe it is integrated with NCRM) |
| ANA | Clarify 10.1 | FTP File | |
| ANA | Clarify 10.1 | Middleware Tuxedo / Tibco | |
| ANA | TMOS | Middleware Tuxedo | |
| CAC on-line | CRM (Clarify 11.5) | FTP (point to point) | |
| CAC on-line | ATG | FTP (point to point) | |
| CAC on-line | Imagen | | |
| CAC on-line | CMS-Centre Vu | FTP (point to point) | |
| CAC on-line | IEX | FTP (point to point) | |
| CID (Post-paid) | Clarify 10.1 | FTP; Tuxedo | |
| Clarify 10.1 | TUXEDO FENIX | Tuxedo | |
| Clarify 10.1 | BILLING INTERFACES (Tux. Facturación, Tux. Red-Mediación, Tux. Consulta) | Tuxedo | |
| Clarify 10.1 | CUR | Tuxedo/Tibco | |
| Clarify 10.1 | DDE | Tuxedo/Tibco | |
| Clarify 10.1 | SERPA | Tuxedo | |
| Clarify 10.1 | SGCYR: System of Collections and Retrievals (SAP R/3) | Tuxedo | |
| Clarify 10.1 | SAP R/3 | Tuxedo | |
| Clarify 10.1 | NPPI | Tuxedo/Tibco | |
| Clarify 10.1 | Infranet 7.2 | Tuxedo | |
| Clarify 10.1 | DWH | FTP | Using TCP/IP |
| Clarify 10.1 | NCRM (Clarify 11.5) | Tuxedo | |
| Clarify 10.1 | ARBOR 11.8 | Tuxedo | |

| System | Interaction | Via | Notes |
|---|---------------------------|--|---|
| Clarify 10.1 | Apolo Provisioning system | Tuxedo/Tibco | |
| Clarify 10.1 | SIRA | Tuxedo | |
| Clarify 10.1 | Infranet 7.2 | Tuxedo /Tibco (rv) | |
| Clarify 10.1 | HP-IUM Mediation | FTP | |
| Clarify 10.1 | Conciliaciones | FTP | Using TCP/IP. From Conciliaciones to Clarify 10.1 |
| Clarify 10.1 | GAE | Tibco (rv) | Two ways: - Fraud Hotline, account deactivations, changes of MSISDN |
| CMS-Centre Vu (v11) | ICM | Batch interface & online interface through CTI signaling | |
| CMS-Centre Vu (v11) | CAC on-line | FTP | |
| CMS-Centre Vu (v11) | IEX | Others (TCP/IP) | |
| CMS-Centre Vu (v11) | Wall Displays | Others (TCP/IP) | |
| Communication Manager (PBX)-ACD (Elite) | CTI (Ct-connect/CIM) | Others (ASAI protocol) | |
| Communication Manager (PBX)-ACD (Elite) | ICM | Others (ASAI protocol) | |
| Credits | Clarify 10.1 | Tuxedo | |
| CTI | IVR-MARC & SIVA | Others (CT-Connect protocol) | |
| CTI | NCRM (Clarify 11.5) | Others (CT-Connect protocol) | |
| GAE | Activa (Clarify 10.1) | Tibco | Two ways: Activation of corporate authorized |
| GAE | Clarify 10.1 | Tibco | Two ways: validation of customer type (Corporate) |
| GAE | CUR | Tibco | Two ways: Service deactivations. |
| GAE | DWH | FTP | Batch: Sends to DWH the KPIs authorization data |
| GAE | Fraud System (HPFMS) | FTP | Batch: Sends to Fraud the corporate authorization data |
| GAE | ICM | FTP | Batch: Sends to ICM the corporate authorized profile data |
| GAE | IVR | Tibco | Password management and user inquiry |
| GAE | IRIS | Tibco | Functional blocks inquiry for profile type. |
| GAE | Mi Vodafone | Tibco | User management |
| GAE | NCRM (Clarify 11.5) | Tibco | Password activation, password reset, object authorization, object deauthorization, responsible change, etc. |
| ICM | NCRM (Clarify 11.5) | FTP | Batch |
| ICM | Clarify 10.1 | FTP | Batch |
| IEX | CMS-Centre Vu (v11) | FTP | Batch |
| IEX | CAC on-line | FTP | Batch |

| System | Interaction | Via | Notes |
|---------------------|------------------------|--------------------|--|
| Imagen | Loyalty rewards system | FTP | Point to point |
| Imagen | Clarify 10.1 | Tuxedo | |
| Imagen | Activa (Clarify 10.1) | Tuxedo | |
| Imagen | DWH | FTP | |
| Imagen | SEGMENTATION MASTER | FTP | |
| Imagen | DOC1 | FTP | |
| Imagen | Facturaweb | FTP | |
| Imagen | Badex | FTP | |
| Imagen | IRIS | FTP | |
| Imagen | IVR - SIVA | Tuxedo | |
| Imagen | Clarify 10.1 | Tuxedo | |
| Imagen | Activa (Clarify 10.1) | Tuxedo | |
| Keyword | NCRM (Clarify 11.5) | Tuxedo | |
| Keyword | DOC1 | FTP | |
| Keyword | DWH | FTP | |
| Keyword | CID | Tuxedo | |
| Keyword | IVR - SIVA | Tuxedo | |
| My Vodafone | Clarify 10.1 | Tuxedo /Tibco (rv) | |
| My Vodafone | Apolo Pre-paid | Tibco (rv) | |
| My Vodafone | CRM (Clarify 11.5) | Tibco (rv) | |
| My Vodafone | Intranet 7.2 | Tibco (rv) /Tuxedo | |
| My Vodafone | OTA | Web Services | |
| My Vodafone | DWH | Tuxedo /Tibco (rv) | |
| My Vodafone | Imagen | Tuxedo /Tibco (rv) | |
| My Vodafone | SERPA | Tuxedo /Tibco (rv) | |
| My Vodafone | Loyalty rewards system | Tuxedo /Tibco (rv) | |
| My Vodafone | Welcome Pack | Tuxedo /Tibco (rv) | |
| My Vodafone | GAE | Tibco (rv) | Corporate authorized validation, user activation, authorized deactivation. |
| NCRM (Clarify 11.5) | Loyalty rewards system | Tuxedo /Tibco (rv) | Records interactions in Clarify11.5 when the customer changes points on the sales channel (both in dealers or “new Concept” shops). |
| NCRM (Clarify 11.5) | IVR (Ydilo) | FTP | IVR System. Records interactions in NCRM showing what the customer has done through this channel |
| NCRM (Clarify 11.5) | IVR (MARC & SIVA) | Tuxedo /Tibco (rv) | IVR asks to C11.5 what customers have been migrated from C10.1 to C11.5. Records interactions in C11.5 showing what the customer has done through this channel |
| NCRM (Clarify 11.5) | IXOS | Tuxedo /Tibco (rv) | Faxes and document storage. It's integrated with Clarify 11.5 for Fax Management functionality |
| NCRM (Clarify 11.5) | DOC1 | FTP Files | NCRM sends information to DOC1 to send predefined mailing to the customers. |

| System | Interaction | Via | Notes |
|---------------------|--|--------------------|---|
| NCRM (Clarify 11.5) | Faxination | Tibco (rv) | Creates an action item in NCRM in case of: -Faxes sent from NCRM -Faxes sent from -Portability or Activa -Income faxes |
| NCRM (Clarify 11.5) | TIBCO IM | Tuxedo /Tibco (rv) | Middleware |
| NCRM (Clarify 11.5) | My Vodafone | Tuxedo /Tibco (rv) | Records interactions in C11.5 showing what the customer has done through this channel |
| NCRM (Clarify 11.5) | SIRA | Tuxedo /Tibco (rv) | Records interactions in C11.5 related to customer's top-ups |
| NCRM (Clarify 11.5) | Portability System | Tuxedo /Tibco (rv) | Records interactions in C11.5 when the customer's sent us a fax |
| NCRM (Clarify 11.5) | Catálogo commercial Catálogo Contratación | Tibco (rv) | Contains the VFS product catalogue for prepaid customers. It's integrated with Prepaid Consoles. Contains the rules to invoke the right Tibco service for each action on each product |
| NCRM (Clarify 11.5) | Clarify 10.1 | Batch & Tuxedo | Synchronization in case of activation, deactivation or just update of customer, count or services data between NCRM and Clarify10.1. Audit processes are batches that compare data files and change wrong data via Tuxedo. |
| NCRM (Clarify 11.5) | Activa (Clarify 10.1) | Tuxedo /Tibco (rv) | Records interactions in C11.5 when the customer's sent us a fax |
| NCRM (Clarify 11.5) | ARBOR 11.8 | Tuxedo /Tibco (rv) | NCRM asks ARBOR for accounting data (online searches). |
| NCRM (Clarify 11.5) | SEGMENTATION MASTER | Tuxedo /Tibco (rv) | Segmentation Master send each 3 months a file containing customer's segment. |
| NCRM (Clarify 11.5) | NOVA | Tuxedo /Tibco (rv) | Records interactions in C11.5 showing what the dealer has offered to the customer NCRM asks to NOVA for detailed information about dealers (NOVA is the master repository). |
| NCRM (Clarify 11.5) | SAP R/3 | Tuxedo /Tibco (rv) | NCRM asks SAP for the customer 's collection status. |
| NCRM (Clarify 11.5) | IHD over Clarify-AMDOCS; | Tuxedo /Tibco (rv) | NCRM asks CUR for data about prepaid services (such as status...) |
| NCRM (Clarify 11.5) | NBA | Tuxedo /Tibco (rv) | NCRM asks NBA if there're any next best activities to offer to a concrete customer by a concrete CSR. |
| NCRM (Clarify 11.5) | Remedy | Tuxedo /Tibco (rv) | Clarify 11.5 asks Remedy the network configuration data related to the subcases opened when there is a network incident. Remedy updates Clarify 11.5 when |

| System | Interaction | Via | Notes |
|---------------------|------------------------------|-----------------------|--|
| | | | the NTR's been closed. |
| NCRM (Clarify 11.5) | On-line stores | Middleware Tuxedo | Data from online shops customers is register and updated in Clarify 11.5. |
| NCRM (Clarify 11.5) | Control de Consumo | Tuxedo /Tibco (rv) | |
| NCRM (Clarify 11.5) | SERPA | Tuxedo /Tibco (rv) | It sends orders to SERPA for change any parameters on the customer voicemail (is for trouble management purposes). |
| NCRM (Clarify 11.5) | Network Configuration System | Tuxedo & FTP | This system sends to NCRM information about updates in the data of antenna's location owners. |
| NCRM (Clarify 11.5) | CTI (Ct-connect/CIM) | Others | Telephony integration based on ActiveX (In-house dev.) |
| NCRM (Clarify 11.5) | MAILS MANAGER (ATG) | Others | DDE Messages (In-house development)/Socket connection. ATG communicates with NCRM to manage email and chat contacts. ATG registers email/chat data (such as subject, body, attachments, from/to addresses, etc) and NCRM records contact data (related customer, reason of contact, channel, etc). |
| NCRM (Clarify 11.5) | NPPI | Tuxedo /Tibco (rv) | NCRM sends a flat file with the “Lortad” or “Robinson” customers (Spanish data protection law). |
| NCRM (Clarify 11.5) | GAE | Tuxedo /Tibco (rv) | GAE (Corporate Authorized staff Management) is the system that manages authorized staff for corporate customers and their authorizations on customers, accounts and services and it's fully integrated with Clarify 11.5 and other channels. |
| NCRM (Clarify 11.5) | Rivendel | Middleware Tibco | Records interactions in C11.5 showing what SMSs have been sent to the customer through Rivendel platform |
| NCRM (Clarify 11.5) | Rivendel | FTP File | Records interactions in C11.5 showing what SMSs have been sent to the customer through Rivendel platform |
| NCRM (Clarify 11.5) | HLR - HMIG | Middleware Tibco | NCRM asks for the voicemail status to HLR-HMIG platforms. |
| NCRM (Clarify 11.5) | SDP | Middleware Tibco | NCRM asks SDP for a concrete prepaid customer balance. It's used for trouble management. |
| NCRM (Clarify 11.5) | DWH (Aida) | SFTP Files | NCRM sends nightly data feeds to store customer management information |
| NCRM (Clarify 11.5) | CAC on-line | FTP File | NCRM sends files periodically providing information about interactions, cases and subcases managed in that period. |
| NCRM (Clarify 11.5) | Commissions | FTP File | Batch process to load SFID (Sales Force ID) data in NCRM. |

| System | Interaction | Via | Notes |
|---------------------|--------------------------------|-----------------------------|---|
| NCRM (Clarify 11.5) | Capture Data | FTP File | Bulk load in NCRM of customer contacts through Capture Data |
| NCRM (Clarify 11.5) | ICM | FTP File | NCRM sends by batch last updates in customer's accounts or services (in order to route properly the contact). |
| NCRM (Clarify 11.5) | SAP R/3 | FTP File | NCRM sends a flat file with the contact data of customers that have any pending debt with Vodafone. |
| NCRM (Clarify 11.5) | NOVA | FTP File | NCRM sends via batch to NOVA information about churn propensity (concrete customers) and information about the evolution of the opened customer's cases. NOVA can also open customer cases in NCRM via batch. |
| NCRM (Clarify 11.5) | SIGRA | FTP File | Batch process that receives via Tibco, the list of countries and Opcos that have a roaming contract with Vodafone. |
| NCRM (Clarify 11.5) | PDM | FTP File | PDM generates a weekly file with information about the mail sent to customers (promotions and invoices mainly). A batch process reads this file and register interactions in NCRM. |
| NCRM (Clarify 11.5) | Experian | FTP File | NCRM sends information to update guides that are sent to CMT. |
| NCRM (Clarify 11.5) | Morpheus | Tuxedo/Tibco (rv) | Morpheus records an on-line interaction detailing the customer scoring. |
| NCRM (Clarify 11.5) | Prepaid promotions application | FTP File | NCRM sends a flat file with the “Lortad” or “Robinson” customers (Spanish data protection law). |
| NCRM (Clarify 11.5) | MCP8 | FTP File & Tuxedo/Tibco(rv) | NCRM sends a flat file with the “Lortad” or “Robinson” customers (Spanish data protection law). |
| NCRM (Clarify 11.5) | IRIS | Tuxedo/Tibco (rv) | Faxes management from IRIS. Active X interface (toolbar) for “Televenta” platform |
| NCRM (Clarify 11.5) | Fraud System (HPFMS) | FTP File | NCRM sends the customers that have request a change to the Fraud System. |
| NCRM (Clarify 11.5) | ACNAC | FTP File | NCRM sends weekly files with CSRs information and codifications. ACNAC sends interactions to NCRM when the emergency is over. |
| NCRM (Clarify 11.5) | Keyword | Tuxedo/Tibco (rv) | When the customer contacts the call centre, NCRM shows a hint if he/she has a key word. When the customer asks for its key word, NCRM records an interaction (it's a batch process) |
| NCRM (Clarify 11.5) | NBA | Tuxedo/Tibco (rv) | NCRM asks NBA if there're any next best activities to offer to a concrete customer by a concrete |

| System | Interaction | Via | Notes |
|--------------------------------|--|---------------------------------|---|
| | | | CSR. |
| NCRM (Clarify 11.5) | Imagen | FTP File | NCRM sends a flat file with the “Lortad” or “Robinson” customers (Spanish data protection law). |
| Next Best Activity (NBA) | NCRM (Clarify 11.5) | Tuxedo /Tibco (rv) | |
| Next Best Activity (NBA) | DWH | FTP (point to point) | |
| Next Best Activity (NBA) | CID | FTP | IP (point to point) |
| Next Best Activity (NBA) | Campaign Management | FTP | IP (point to point) |
| Next Best Activity (NBA) | HP-IT/O (monitoring) | Others | SNMP (point to point) |
| NICE | NCRM (Clarify 11.5) | FTP | Batch |
| PDS | Communication Manager 2.2-ACD Elite 12.0 | Others | TCP/IP and voice circuits |
| PDS | SAP R/3 | FTP | |
| PDS | CRM (Clarify 11.5) | FTP | DDE |
| Portability System | CRM (Clarify 11.5) | Middleware Tibco | |
| Portability System | SAP/R3 | Middleware Tibco | |
| Portability System | NOVA | FTP File | |
| Portability System | TIBCO | Tuxedo /Tibco (rv) | |
| Portability System | Clarify 10.1 | Tuxedo /Tibco (rv) | |
| Portability System | Activa (Clarify 10.1) | Tuxedo /Tibco (rv) | |
| Portability System | Imagen | Middleware Tuxedo | |
| Portability System | Campaign Management System | FTP File | |
| Portability System | DWH | FTP File | |
| Portability System | Fraud System | FTP File | |
| Preactivated cards management | NCRM (Clarify 11.5) | Tuxedo FTP | |
| Preactivated cards management | HPFMS (Fraud system) | FTP | |
| Precos | Clarify 10.1 | FTP | |
| Loyalty Points Calculation | Clarify 10.1 | Tuxedo | |
| Loyalty Points Calculation | Loyalty Rewards System | | |
| Prepaid promotions application | Clarify 10.1 | FTP File | B -> A |
| Prepaid promotions application | Loyalty Rewards System | FTP | |
| Query web | DOC1 (DOC1 4.3m) | Tuxedo & Batch process | |
| Query web | Imagen | Tuxedo | |
| Query web | Loyalty rewards system | Batch Process (to be confirmed) | |
| Query web | Commercial Portal | Batch Process (to be confirmed) | |
| Query web | Faxination | Tuxedo / FTP | |

| System | Interaction | Via | Notes |
|----------------------------------|----------------------------|----------------------|--|
| Query web | Mails Manager (ATG) | Tuxedo | |
| Query web | IVR - Ydilo | FTP (point to point) | |
| Scorex | Activa (Clarify 10.1) | Tuxedo | |
| Scorex | SAP/R3 | FTP | |
| IVR-SIVA | NCRM (Clarify 11.5) | Tuxedo | |
| IVR-SIVA | Clarify 10.1 | Tuxedo | |
| IVR-SIVA | DWH | FTP | |
| IVR-SIVA | SAP R/3 | Tuxedo /Tibco (rv) | |
| IVR-SIVA | SDP | Tuxedo | |
| IVR-Ydilo | My Vodafone | Webservices | |
| IVR-Ydilo | Loyalty Points Calculation | Tuxedo | |
| IVR-Ydilo | NCRM (Clarify 11.5) | Tuxedo | |
| IVR-Ydilo | DWH | FTP | |
| IVR-Ydilo | SAP/R3 | Tuxedo/Tibco | |
| IVR-Ydilo | GAE | Tibco (rv) | Authorized inquiry, password validation and reset. |
| SMS Callback | NCRM (Clarify 11.5) | Tuxedo | |
| WAMA (Post-sales Service System) | Imagen | Tuxedo | |
| WAMA (Post-sales Service System) | SAP R/3 | FTP File | |
| WAMA (Post-sales Service System) | CID | FTP File | |
| WAMA (Post-sales Service System) | DOC1 | FTP File | |
| WAMA (Post-sales Service System) | DWH | FTP File | |
| WAMA (Post-sales Service System) | SEGMENTATION MASTER | FTP File | |
| WAMA (Post-sales Service System) | ARBOR 11.8 | Tuxedo /Tibco (rv) | |
| WAMA (Post-sales Service System) | Clarify 10.1 | Tuxedo /Tibco (rv) | |
| WAMA (Post-sales Service System) | Commercial Portal | | |
| WAMA (Post-sales Service System) | My Vodafone | | |
| WAMA (Post-sales Service System) | SERPA | | |
| WAMA (Post-sales Service System) | Imagen | | |
| WAMA (Post-sales Service System) | ARBOR 11.8 | | |
| WAMA (Post-sales Service System) | Query web | | |
| WAMA (Post-sales Service System) | NOVA | | |
| WAMA (Post-sales Service System) | IMEI Control | Tibco (rv) | |
| WAMA (Post-sales Service System) | SMS platform (SMSC) | Tibco (rv) | |
| WAMA (Post-sales Service System) | IRIS | Tuxedo /Tibco (rv) | |
| Wall Displays | CMS-Centre Vu | Others | Opens a terminal emulation |
| Webinforma | Informa | Tuxedo | |

| System | Interaction | Via | Notes |
|--------------|------------------------|--------|-------|
| Welcome Pack | Loyalty Rewards System | Tuxedo | |
| Welcome Pack | Clarify 10.1 | Tuxedo | |
| Welcome Pack | DWH | FTP | |
| Welcome Pack | NCRM (Clarify 11.5) | FTP | |
| Welcome Pack | ACNAC | FTP | |

6.4 Planned Changes and Known Architectural Issues

The contact centres architecture is too complex and new centres are needed. This means that some changes may imply a high cost and effort than with a simpler architecture. Currently, a new architecture is under execution: basically, it consists on reducing the number of PBXs from 11 to 3 with the following main constraints:

- Every Contact Centre will be connected to one of these 3 PBXs via a switch with an IP connection (enabling VoIP).
- Every Ydilo will be connected to two PBXs. In principal, there won't be SIVA after migration process.
- There will be 3 CTIs instead of current 8, connected to every PBX.

Currently there are 2 main IVRs that are in place to handle voice services – approximately 90% of the traffic goes via Ydilo with roughly 10% going through Siatvox or SIVA (depending on the offered services, there may be two types of Siatvox servers: MARCS or SIVA strictly speaking). There is a migration process in place to move the remaining functionality from SIVA to Ydilo. (Other IVRs is MACS but these two are the main ones).

Current interaction about NCRM and ICM will substituted by a Segmentation – ICM, this means that Segmentation will be able to consolidate the information about segment and data of the customer that is calling and is sent to ICM.

Long-term, there are plans in place to connect IEX with Mails Manager (ATG) through a batch connection via ftp but this is not current scheduled. Post-paid provisioning will be moved out of Clarify 10.1. There are high level plans to do this in the new Vodafone Spain Roadmap project. Clarify 10.1 has been highly customised and this will make the upgrade/migration onto a different platform is a difficult task.

Canal Online will be the unified channel to the internet customer. It will be cover the current Online Shop, Web Grandes Cuentas, eServices and eSales with a single architecture supporting all the functionalities. This new infrastructure will be outsourced.

The provisioning and customer contact management functionalities are being analyzed to implement a new system that covers all these purposes in a long-term. This project will affect, at least, to Clarify 10.1 and NCRM (Clarify 11.5) systems.

7 Enterprise Management

7.1 Overview

The main Enterprise Management functionality takes place within SAP. A stable implementation is in place and was upgraded in 2004 to the current operating version 4.7.

The subsections below describe each SAP component and its high level functionality.

FI - The Financial Accounting (FI) application component fulfils all the requirements that must be met by the financial accounting department of an organization. It provides the following features:

Management and representation of all accounting data

Open and integrated data flow

Preparation of operational information to assist strategic decision-making within the organization

AM - Asset management. The source of most of the assets of VF-SP are provided by Geiser – bespoke functionality over SAP to manage the VF-SP investments.

CO – Controlling (CO) supports the cost management for expenses and for investment costs, in planning, budget and execution level. The submodules used in VF-SP are CO-CCA , CO-PA and CO-OM.

HR Features:

- Personnel Management (PA)
 - PA-PA Personnel administration
 - PA-BN Benefits administration
 - PA-PD Personnel development
 - PA-CM Compensation management
 - PA-ES Employee self-service (which is going to be replaced with the MOPE project).
- Personnel Time Management (PT)
 - Only used PT-RC Time data recording and administration
- Payroll (PY)
 - An external company (ADP) executed the payroll that is charged in the SAP payroll cluster.
- Training and Event Management (PE)

Most of the interactions in HR Management are batch processes via FTP.

With the MOPE project (See further details in the planned changes and Known Architectural Issues), in SAP with a Web portal in weblogic using the JOC to connect with SAP, there are:

- A new Employee self service (the old one should disappear).
- The who is who functionality of the Intranet is now in MOPE so it's duplicated by the moment.
- And the workflow for absence request applications is in Sap instead of Lotus Notes Workflow applications.

SD – Sales and Distribution supports all the sales and distribution flow : creation of sales orders, deliveries, picking documents, goods issues and invoicing.

- When the order is created the corresponding taxes are calculated.
- The credit management is controlled when the delivery is created .
- There is not possible account a good issue if there isn't enough stock in the warehouse.
- When the invoice is created the taxes are executed.
- Some documents need to be printed using forms and other SAP standard development tools.

MM - Materials Management (MM) supports all the phases of materials management: materials planning and control, purchasing, goods receiving, inventory management, and invoice verification. It consists of: Consumption-Based Planning - based on past consumption values and uses the forecast or other statistical procedures to determine future requirements. The procedures in consumption-based planning do not refer to the master production schedule.

Purchasing - performs External procurement of materials and services, determination of possible sources of supply and monitoring of deliveries from and payments to vendors.

Supplier Workplace - allows suppliers (vendors) access to a manufacturers' (customers') SAP System.

The E-Commerce application serves as an alternative or enhancement to the EDI communication that is used in material procurement

External Services Management - supports the complete cycle of bid invitation, award/order placement phase, and acceptance of services, as well as the invoice verification process.

PS – Project System. This module manages the materials associated to a project. This module connects with investment budget, the purchase of associated orders, with accounting when the goods are received and the invoices are created and with fixed assets when these costs are cleared. The objective is to manage the activation of the temporally failed expenses.

TR - The Treasury module has Cash Management and Cash Budget Management functionality

QM - With the functions of the Quality Management (QM) module, you can implement the most important elements of a QM system, as specified in ISO 9000. These functions are complemented by other integrated application components of the SAP system (such as MM, SD, PP).

PM – Plant maintenance used for the preventive maintenance of the measure equipments of VF-SP, also for the equipments in the network spare parts master data.

RE – Real Estate Management. This component maps the requirements of Real Estate Management in a general overview of the relevant business transactions:

- Management of real estate
- Lease out
- Third-party management
- Lease in
- Control of business processes relevant to real estate
- Evaluation mechanism

IM – Investment management. This module manages the investment planning and budget for network, for IT projects...

FM – Funds Management. The functions in the Funds Management component support you in creating and executing budgets. The functions in this component support you in creating and executing budgets. You can adapt the budget to changes in conditions by entering releases, supplements, returns, and transfers.

SGCyR – Sistema de Gestion de Cobros Y Recobros – Management System for Collections and Recoveries.

7.2 High-Level Architecture

The following diagram details how Enterprise Management Spain Architecture.

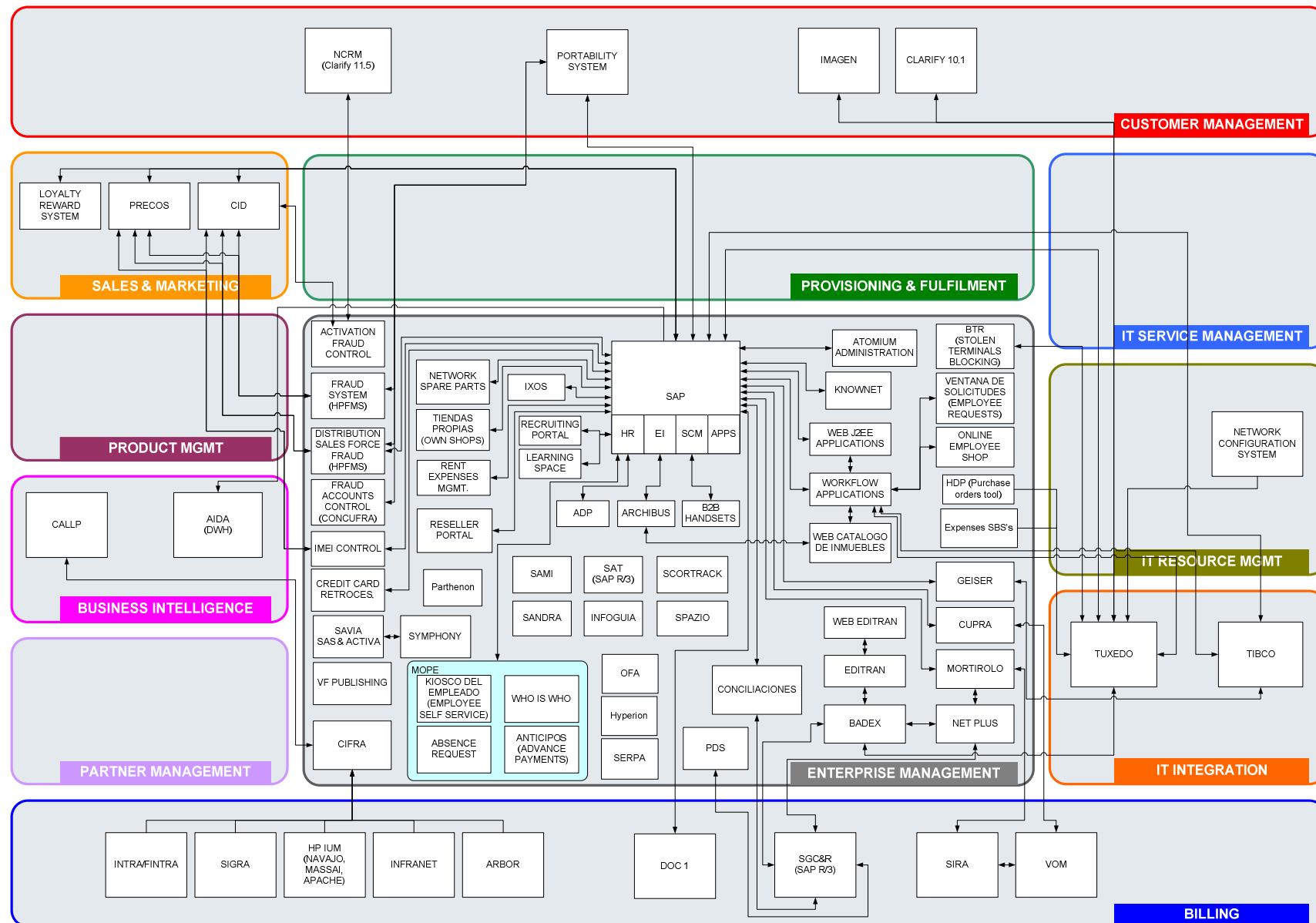


Figure 4 – Enterprise Management High Level Architecture

7.2.1 System Details

| System | Description |
|--|--|
| ADP | ADP manages payroll and is an external system. |
| BSC | Balance Scorecard. See reference within the Business Intelligence & MIS section of this document for further information. |
| CID | This system is used to pay the commissions to the distributors. |
| Activations fraud control (Control cuentas de fraude) | Application to control the fraudulent activations performed by the dealers by cheking if the activated services have traffic during the first 6 months. |
| Credit Card Retrocession | This application allows the registration and management of all the actions done to analyse the reasons for canceling the credit card charges done to clients, searching for fraud patterns and situations. |
| Fraud Accounts Control (CONCUFRA) | This application allows the control of possible fraudulent accounts. It works according to certain customer patterns, working on the information stored in order to do a close follow-up of those possible fraudulent customers. |
| Fraud System (HPFMS) | Usage fraud (voice, data, VAS) for traffic in our own network and roaming. Fraud in orders and loyalty program. Different alarms through predefined patterns based in CDR and customer data analysis. Prepaid analysis (Top-up control, balance adjustments, ...). |
| Distribution Sales Force Fraud System (HPFMS). Fraude Distribución | Fraud Distribution is an application for controlling and detecting the fraud in the distribution people. It will be controlled and measured (KPI's) all the purchase process, i.e.: since a pack gets the shop until it leaves it. All interfaces with other VF internal systems will be generated to feed up the application which handles those data in order to be able to obtain these reports and alarms. |
| Sistema de Control (CIFRA) | Revenue Assurance Switch to Bill system. It will be replaced by CAPE Revenue Office. |
| Sistema de conciliaciones (Conciliaciones) | Revenue Assurance Provisioning Billing reconciliations. |
| Switch Audit | Revenue Assurance Provisioning Network reconciliations. |
| DOC1 | This system formats document content, allowing documents to be printed and sent to mail |
| DWH (AIDA) | The Data Warehouse. See reference within the Business Intelligence & MIS section of this document for further information. |
| EDI | Electronic Data Interchange – this performs a similar function to EDITRAN. This is a type of protocol. |
| EDITRAN | This system is used to connect to the bank to pay wages. This enables communication between Vodafone systems and external banks. |
| EVOLUCIONA | This is a Peoplesoft performance management system, customised in-house by Vodafone. Nowadays, it maintains the VF SP employees' historic performace management, although it has been already substituted by the Global Performance Dialogue. |
| INCENTIX | This is a commission web based system for handling sales staff. |
| Infoguia | It allows the access and management to all the documents used by the contact centre agents in their day to day customer care work. Due to be replaced by a new Knowledge Management solution. |
| IXOS | An archive system for SAP and for any physical document (except faxes that are in a migration process and will be in IXOS from march 2006). |
| OFA | Oracle Financial Analysis - handles budget etc. expenses budget goes to FM, finances reporting goes to Hyperion |
| Morpheus | System to verify the bank accounts of the new postpaid customers. It performs the check once the activation has been performed and according to certain predefined patterns. |
| Mortirolo | Mortirolo handles credit checking on credit cards – passing the information into NETPLUS to manage the payment collection once credit verification is satisfied. |

| System | Description |
|--|---|
| NETPLUS | NETPLUS is a system that takes payments over the web from credit cards and connects through to the banks. |
| Passat Plus | This is free software. It will be replaced by NETPLUS IN future. |
| RIHO (EIS) | This is a database that supports balanced scorecard, customer traffic, minutes, usage, network use. It is a repository only. |
| SAMI | This system is used with the logistic operator to demand new terminals |
| SAP | The Enterprise Resource Planning systems for Vodafone Spain. Further detail in Enterprise Management overview of its functions and implementation. |
| SAVIA ACTIVA & SAS | A non-critical system that provides legal and regulatory information. Official information that is required as part of Vodafone's license agreements such as customer number and usage figures are distributed through to the government from this system. SAVIA ACTIVA will be replaced by SAVIA SAS, although both of them will be executed in pararell until March 2007. Both SAVIA ACTIVA and SAVIA SAS have the same functionality. |
| Stratus | This system handles revenue sharing. See reference within the Rating section of this document for further information. |
| Web Editran | This system allows the user to see the status of files that have been sent to banks |
| XRT Universe | Commercial software from CerfFinance to understand cash position |
| Online Employee Shop | Online Shop where employees are able to purchase prepaid packs, accessories, etc. |
| Learning space (employees) | It is the e-learning platform in VF-ES. Gives Vodafone employees the possibility to take the advantage of online trainings |
| Learning space (sales force people) | It is the e-learning platform in VF-ES. Gives Vodafone employees in charge of te sales force, the possibility to take the advantage of online trainings |
| Knownet | It's the VF Spain Knowledge management application |
| Symphony | SYMPHONY is the tool made by PriceWaterhouse Holland as Telecompass used to generated the reports with costs and revenue that we have to send every 31st July to the CMT (Commission from Telecommunications market) . This is a legal obligation for all telephone companies in Spain. The information is generated every year. |
| Advance payments (Anticipos) | Application (in house development over Lotus Notes) to manage automatically the employee advance payments |
| AMADEUS | User management tool |
| Archibus | Application to manage of all tasks related to real estates service. |
| Atomium Administration | System to manage other Spanish operators invoices |
| Availability hours | Application (in house development over Lotus Notes) for managing the employee availability-extra hours |
| BADEX | Application (with a web interface) used by the activations department to perform credit checks onto the Badex system. The bad debtors credit information is send to SANEF (Spanish bad debtors data used by financial entities to reject a credit request). |
| BTR- Blocking system for stolen phones | Application to block stolen phones. |
| CUPRA | Web applicaction to control prepaid vouchers |
| Employee Requests (Ventana Solicitudes) | Application (in hose development over Lotus Notes) to the VF Spain Employees ask for vacations, maternity leave, handsets, etc. |
| Employee self-service (Kiosco Empleados) | Web application for employees to see personal and payroll data (Kiosco Empleados). |
| Expenses SBS's | Expenses SBS's is a workflow lotus notes application to make the SBS's request, include its expenses and the workflow needed for its approval. |
| Geiser: Investments purchase flow | To control the investments in the VF network. |

| System | Description |
|-----------------------------|--|
| HDP (Purchase orders tool) | Purchase orders tool application |
| Hyperion | HYPERION Enterprise is a tool for reporting to Vodafone Group the comparison between real data and budget data (OFA). HYPERION feed to Decision support system which generated the BSC (Balance score card). |
| Parthenon | Application for the product inventory and development lifecycle of that products. |
| IMEI Control | This application is used to track a phone life cycle, i.e. since it is launched by logistics until an end customer buys it. This tracking allows to validate some information associated to phones in order to identify some fraud types and deliver enough information to calculate distributors commissions. The information coming from phones life cycle tracking is also used for blocking stolen phones. |
| WorkFlow Apps | They are all workflow application (most of them with web interface) for the different VF department (FI, HR, etc., and VF employees in general). See attached file below, with the list of all applications. Mainly, intranet applications based on Notes architecture oriented to departements / groups or the whole company. |
| Web J2EE Apps | Intranet, internet, Cac and extranet applications based on J2EE architecture (mainly over a Weblogic Application Server). They are oriented to customers (in vodafone.es), sales force (commercial portal, etc.), CaC and Employees (departements / groups or the whole company such as the local people finder, etc.) |

7.2.2 Functional Coverage

GITA L2 functional implementation table:

| Function | Description | Implementation |
|----------------------|--|---|
| ERP Invoicing | The ERP Invoicing sub-domain covers the ability to produce invoices for products (handsets, SIMs, accessories, physical or virtual vouchers, etc...) or non-telecoms services. | SAP R/3 DOC1 (DOC1 4.3 m1) Gallery Atomium Administration Stratus SAT: Technical Assistance Service (SAP R/3). SGCyR : System of Collections and retrievals (SAP R/3) FCC:Invoicing credit and charges to distribution (SAP R/3). EDI IXOS SAP/R3 |
| Financial Management | The Financial Management sub-domain includes the functions required to ensure the effective management of all financial aspects of the business, such as financial accounting (including management of accounts receivable (AR), accounts payable (AP) and general ledger (GL) functions, management accounting, cost accounting, budgets and forecasting and cash and asset management. | SAP R/3: GL, AP , AR, TR,AM, IM, FM, CO PA,CO CCA Passat Plus/ NETPLUS Web Editran/ Editran XRT Universe (Cerf finance) Stratus OFA (budgetting) SAP/R3 |

| Function | Description | Implementation |
|------------------|--|--|
| Fraud Management | Proactive and reactive analysis and investigation of fraudulent or potentially fraudulent activity. This can include customer profile and usage collection and examination, fraud detection and analysis techniques application. | BTR- Blocking system for stolen phones BADEX Morpheus Webinforma Fraud System (HPFMS) Activations fraud control Preactivated cards management Credit Card Retrocession IMEI control Credit Card Retrocession Distribution Sales Force Fraud System (HPFMS) |
| HR Management | The HR Management sub-domain is responsible for managing all aspects of the company workforce, including performance management, payroll, training and recruiting. Also includes; Time & Attendance, Compensation & Benefits Administration, Personnel Cost Planning, Personnel Administration, Organisation Management, Personnel Development & performance reviews, Training Management, Expense & Travel Admin and activities to ensure compliance with HR legislation. | WorkFlow apps (based on Lotus Notes) and Web J2EE apps (based on Weblogic):eg: Training approvals, Develop - eVoluciona, etc, Recruiting Potal, Who is Who*, etc. Employee self-service – Kiosco Empleado (SAP R/3)*. OFA DWH (AIDA) IXOS Recruiting portal (INTRANET) INCENTIX Knownet People soft (Evolucionaria) Learning space Absences Request, Availability hours and Advance Payments based on Lotus Notes SAP/R3 |

| Function | Description | Implementation |
|----------------------------------|--|--|
| Knowledge Management | The Knowledge Management sub-domain covers the acquisition or creation of the knowledge needed to support organisational objectives and the processes involved in making relevant knowledge available to the appropriate person at the appropriate time. | NCRM (Clarify 11.5) Keyword Commercial Portal NBA DWH Infoguia Knownet Web J2EE Applications based on Weblogic (eg: Emails massive sending, Pais, ISP Service Matrix, etc), Learning applications, Intranet Portals (eg: Mobile Intranet, Vacancies, eQLS, My Brand, etc.) OFA SAVIA RIHO Symphony SAP R/3 Hyperion Commercial Portal Clarify 10.1 DWH (Ainda) Infoguia Keyword NBA |
| Legal and Regulatory Management | The Legal and Regulatory Management sub-domain is responsible for ensuring that the enterprise complies with all relevant legal requirements and government regulations. | SAP R/3 Symphony OFA SAP/R3 SAVIA |
| Project Management | The Project Management sub-domain covers the management of projects within the company, such as corporate change, projects relating to bidding and development/ implementations of large corporate contracts, etc. | SAP/R3 Parthenon |
| Real Estate and Fleet Management | The Real Estate and Fleet Management sub-domain covers project development for sites and locations (e.g. base stations, offices, contact centres, retail outlets). | SAP R/3: RE, AM Archibus Web Real Estates Service Catalogue (Intranet) SAP/R3 |

| Function | Description | Implementation |
|-------------------------|--|---|
| Revenue Assurance | The Revenue Assurance sub-domain supports the ability to ensure that all revenue that should be accrued from registration, subscription, customer orders, and network usage has been tracked and collected accurately and is accurately billed in a timely manner. | TIBCO IM Middleware Fenix (TUXEDO FENIX) Arbor 11.8 SGCyR: System of collections and retrievals (SAP R/3) CRM (Clarify 10.1) NCRM (Clarify 11.5) PassatPlus PDS SMSC DOC1 BADEX NETPLUS CIFRA Clarify eFrontOffice 10.1 Sistema de Control CIFRA Invalid records Management SANDRA Charging Case Audit SERPA SWITCH AUDIT Sistema de Conciliaciones |
| Security Management | This area covers the functionality required to support business continuity by protecting the various data/information assets of the Vodafone network (i.e. customer traffic, network data) from all threats, whether internal or external, deliberate or accidental. | SAP R/3 (Roles) |
| Strategy and Planning | No system serves this purpose specifically though the Balanced Scorecard is possibly used for Strategy purposes as it displays KPIs to senior management for them to base their decisions upon. | No systems specified |
| Supply Chain Management | The Supply Chain Management sub-domain supports the management of contracts and interactions with third party suppliers. | SAP R/3 :MM SAP R/3 :IM, FM, PS, CO CCA; Workflow Galery (IXOS) HdP (Purchase orders tool) Module acceptance minutes Geiser, Expenses SBS's, Investment SBS and Invoice approvals (WorkFlow apps) SAP/R3 |
| Warehouse Management | The Warehouse Management sub-domain covers the functions for handling physical goods from receipt into the warehouse through to the dispatch of the order to the recipient. | SAP R/3: MM, SD Online Employee Shop Internet orders (distributors). Employee terminal reques (Employee Request Portal based on Lotus Notes CUPRA TARSIM Own shops SAP/R3 |

* These applications have migrated to SAP-HR with the MOPE project.

7.3 Key Interactions

System interactions involving SAP are routed through TIBCO and the main methods of communication in Enterprise Management are FTP and RFC.

There are many system interactions within Enterprise Management, so this is not an exhaustive list, but the key interactions are within finance, SGCyR, MM, SD, HR,TR, RE.... Interactions also exist with external systems.

| System | Interaction | Via | Notes |
|--------|--|----------------------------------|---|
| SAP | Actas Aceptación (Module acceptance minutes) | Tuxedo / Tibco (rv) | into SAP Actas Aceptación done on Visual Basic sends information to SAP |
| SAP | Reseller Portal (Portal Proveedor) | FTP | out of SAP Reseller Portal done on Weblogic |
| SAP | Atomium | FTP | into SAP |
| SAP | AIDA (Business Objects/DWH) | FTP | out of SAP |
| SAP | CID | FTP | two-way (C, SQL, Unix Scripts) |
| SAP | IXOS | FTP & Others (RFC) | two-way (Gallery introduce data to SAP) |
| SAP | Hyperion | FTP | out of SAP |
| SAP | Symphony | FTP | out of SAP |
| SAP | SAVIA ACTIVA & SAS | FTP | out of SAP |
| SAP | OFA (Oracle Financials) | FTP | two-way |
| SAP | HdC | Others (RFC) | into SAP HdC done on Visual Basic |
| SAP | HdP | Others (RFC) | two-way HdP done on Visual Basic |
| SAP | Employee Request Portal | FTP | two-way WorkFlow apps (done on Lotus Notes Platform). Such as: Employee Request Portal (Travel booking, absences request: vacations, sick leave, maternity leave, expense receipts, etc.) |
| SAP | Advance Payments | Tibco /Tuxedo | two-way Workflow done on Lotus Notes |
| SAP | SPI | FTP & Others (RFC) | two-way SPI is done on Lotus Notes and sends projects are created by Network Department to SAP |
| SAP | Geiser | FTP & Others (RFC) | two-way Expenses and Investments purchase flow-SBS (Workflow done on Lotus Notes) |
| SAP | B2B client (int)-eHUB (ext) | FTP | Two-way |
| SAP | Activa (Clarify 10.1) | FTP | out of SAP |
| SAP | Docout | FTP | into SAP |
| SAP | INTRA | FTP | into SAP |
| SAP | Email&SMS sending | Others (RFC) | out of SAP |
| SAP | WorkFlow apps | FTP, Tibco/Tuxedo & Others (RFC) | two-way |
| SAP | Doc1 | FTP | out of SAP |
| SAP | EDI | FTP | out of SAP |

| System | Interaction | Via | Notes |
|---------------------------|---|----------------------------------|---|
| SAP | Stratus | FTP | Into SAP |
| SAP | Commercial Portal | Tibco (rv) & FTP | two-way |
| SAP | Editran | FTP | two-way BANKs-Editrans |
| SAP | External companies - logistic operators | FTP | Out of SAP |
| SAP | CUPRA | Online | Out of SAP |
| SAP | TARSIM | Online | Out of SAP |
| SAP | Passat plus | Online | Out of SAP |
| SAP | Net plus | FTP | Out of SAP |
| SAP | NOVA | FTP | Out of SAP |
| SAP | PRECOS | FTP | Out of SAP |
| SAP | IMEI Control | FTP | Two-way |
| SAP | FAXINATION | FTP | Out of SAP |
| SAP | Facys | FTP | Out of SAP |
| SAP | WAMA(postsales) | FTP | Into SAP |
| SAP | Loyalty rewards system | Online | Two ways |
| SAP | Segmentation | Online | Out of SAP |
| SAP | Own Shops | Online | Into SAP |
| SAP | Exchange | FTP | Out of SAP |
| SAP | Factura WEB | FTP | Out of SAP |
| SAP | eVOLUCIONA (People soft) | FTP | Out of SAP |
| SAP | ADP | FTP | two-way |
| SAP | MOPE | Others (JCO) | two-way |
| SAP | Distribution Sales Force Fraud System (HPFMS) | FTP | Out of SAP |
| SAP | Fremap | FTP | Out of SAP |
| SAP | Punto Net (Grecia) | FTP | Out of SAP |
| SAP | Web J2EE Apps | FTP, Tibco/Tuxedo & Others (RFC) | Out of SAP (Done on Weblogic Platform) |
| SAP | Performance dialogue | FTP | Out of SAP |
| SAP | ACCOR | FTP | Out of SAP |
| SAP | Proyecto identidad | FTP | Out of SAP |
| SAP | ASPEN (global e-learning portal) | FTP | Out of SAP |
| Activations fraud control | NCRM | FTP & Tuxedo | |
| Activations fraud control | CID | FTP & Tuxedo | |
| Online Employee Shop | DWH (Aida) | FTP | Interface out of Online Shops |
| Online Employee Shop | NCRM (Clarify 11.5) | Tuxedo | Customers provisioning |
| Online Employee Shop | VF Publishing | Others (Java API) | Front-end contents delivery Point to point (Java API) |
| Online Employee Shop | Mortirolo | Tuxedo | Cards Payment Gateway |
| Online Employee Shop | SAP | Tuxedo /Tibco (rv) | Shop customers, purchases and catalogue management |
| Online Employee Shop | Vidisa | Web Service | Vidisa is a mobile accessories provider, so this service is used to provide accessories to shop catalogue |
| Online Employee | SMS & Email | Tuxedo | |

| System | Interaction | Via | Notes |
|--|--|---------------------|---|
| Shop | | | |
| Credit Card Retrocession | HPFMS (Fraud system) | FTP | |
| Credit Card Retrocession | HPFMS (Fraud system) | FTP | |
| Distribution sales force fraud (HPFMS) | CID | FTP | Post-paid Commissions |
| Distribution sales force fraud (HPFMS) | Precos | FTP | Pre-paid Commissions |
| Distribution sales force fraud (HPFMS) | SAP | FTP | Debtor and creditor codes to the distribution sales force people. |
| Distribution sales force fraud (HPFMS) | DWH | FTP | Analysis purposes |
| Distribution sales force fraud (HPFMS) | IMEI Control | FTP | IMEI Control sends the sell-in, sell-through and sell-out info. |
| Geiser | Network Configuration System | Tuxedo / Tibco(rv) | Network Configuration System sends the purchase order information to Geiser. |
| Geiser | HDP (Purchase orders tool) | Tuxedo / Tibco(rv) | HDP sends the purchase order information to Geiser. |
| Geiser | Expenses SBS's | Tuxedo / Tibco (rv) | Expenses SBS's (WorkFlow done in Lotus Notes) sends information to Geiser. |
| Geiser | SPI | FTP & Others (RFC) | SPI is done on Lotus Notes and sends projects are created by Network Department to Geiser |
| Geiser | Actas Aceptación (Module acceptance minutes) | Tuxedo / Tibco (rv) | Actas Aceptación done on Visual Basic sends information to Geiser |
| Fraud system (HPFMS) | Clarify 10.1 | FTP | Postpaid & Mixed |
| Fraud system (HPFMS) | NCRM (Clarify 11.5) | FTP | Pre-paid |
| Fraud system (HPFMS) | NOVA | FTP | Segmentation |
| Fraud system (HPFMS) | Infranet 7.2 | FTP | SVA |
| Fraud system (HPFMS) | SIRA | FTP | Top Up's |
| Fraud system (HPFMS) | SIGRA | FTP | Roaming -in |
| Fraud system (HPFMS) | Network Configuration System | FTP | Cells positions |
| Fraud system (HPFMS) | HP-IUM (Apache) | FTP | GPRS Fraud Control |
| Fraud system (HPFMS) | HP-IUM (Navajo) | FTP | CDR's, Roaming out Fraud Control |
| Fraud system (HPFMS) | HP-IUM (Massai) | FTP | Mensaweb, sms |
| Fraud system (HPFMS) | ALGA | FTP | SMS |
| Fraud system (HPFMS) | Loyalty Rewards System | FTP | Loyalty |
| Fraud system (HPFMS) | Portability | FTP | Portability (MSISDN) |
| Fraud system (HPFMS) | CUR | FTP | Pre-paid |
| Fraud system | Parex (Apolo) | FTP | Pre-paid |

| System | Interaction | Via | Notes |
|-----------------------------------|---------------------------|-----|----------------------------|
| (HPFMS) | | | |
| Fraud system (HPFMS) | Mortirolo | FTP | Credit Cards fraud control |
| Fraud Accounts Control (CONCUFRA) | CID | FTP | Commissions |
| Fraud Accounts Control (CONCUFRA) | Credit Cards Retrocession | FTP | Retrocessions |
| Fraud Accounts Control (CONCUFRA) | Clarify 10.1 | FTP | |
| Fraud Accounts Control (CONCUFRA) | SAP | FTP | |
| Fraud Accounts Control (CONCUFRA) | NCRM (Clarify 11.5) | FTP | |
| Fraud Accounts Control (CONCUFRA) | CUR | FTP | |
| SAVIA ACTIVA & SAS | OFA | FTP | |
| SAVIA ACTIVA & SAS | SAP R/3 | FTP | |
| SAVIA ACTIVA & SAS | Symphony | FTP | |
| SAVIA ACTIVA & SAS | DWH | FTP | |

7.4 Planned Changes and Known Architectural Issues

SAVIA ACTIVA is being replaced by SAVIA SAS. In November 2006, SAVIA SAS will start to be used although SAVIA ACTIVA must continue being executed until March 2007, due to that information is necessary to the Spanish Telecommunication Regulator (CMT).

Planned changes are:

- To replace Revenue assurance systems (Sistema de Control CIFRA, Sistema de conciliaciones y Switch Audit) with CAPE RevenueOffice.
- To implement MOPE project to replace:
 - The employee self service
 - The who is who
 - And some Lotus Notes applications and workflows

The rest of the setup is operating satisfactorily. Timeline of key projects is as follows (highlight being that SAP has been implemented for 10 years going through various upgrades and additional components.

| | |
|---------------|--|
| October 1995 | Upgrade version 2.2 E |
| October 1997 | Upgrade version 3.0 F |
| July 1999 | Collection and Recovery System (SGCyR) |
| April 2000 | Upgrade version 4.5 B |
| November 2001 | Implantation SAP CO-PA |
| November 2002 | Euro Migration |
| October 2004 | Upgrade version 4.7 (Enterprise) |

| | |
|-----------|-----------------------------|
| July 2005 | Data Center Migration (DCC) |
|-----------|-----------------------------|

Infoguia is due to be replaced by Vodafone Knowledge Management – a Group Project, possibly based on Autonomy and LiveLink, that will include Search and Rating functionality to replace the existing static deployment of Infoguia.

MOPE project

In the MOPE project by SAP with a Web portal in weblogic calling to the SAP data using the Java Connector.

- The 1st phase of MOPE project (SAP-HR) covers:
 - o The employee self service functionality.
 - o The who is who functionality.
 - o The absence request (Lotus Notes workflow application to request vacations, ect.).

Therefore, these applications should disappear in a future.

- And the 2nd phase, to deploy in Nov 2006, covers the functionality of:
 - o Others lotus notes workflow applications: Breastfeeding period, maternity leaves, workday reduction...
 - o Improve the new who is who.
 - o Improve the new employee self service.
 - o Advancement payments.

Revenue assurance systems replacement

The overall goal of this project is to provide Vodafone Spain Revenue Assurance Department with a clear independent, autonomous and transversal view of the various revenue streams and customer provisioning aspects throughout the BSS/OSS chain.

- Independent: because a Revenue Assurance team needs to control the way it interprets information and problems, it needs to be in a position to build its own reports and alarms from low level information without depending on other departments to aggregate and interpret it on their behalf. CAPE RevenueOffice™ achieves this by processing & analysing raw files from across the billing chain to provide Revenue Assurance with the proper alarms and indicators.
- Autonomous: the Revenue Assurance team needs to be able to process raw file and other low level data without having to build the technical capabilities generally found in the OSS/BSS department, nor constantly asking for their support to acquire and interpret this data. Again, CAPE RevenueOffice™ enables this by automatically acquiring, auditing and interpreting this information into indicators relevant to a Revenue Assurance analyst.
- Transversal view: Revenue Assurance is not about monitoring specific platforms or servers, but it's about looking at revenue streams across the BSS/OSS chain and how well or how bad they progress through the various interfaces. CAPE RevenueOffice™ enables the Revenue Assurance department to reach any point in this network, and constantly looks at any information measured through the contribution its makes to the various revenue streams.

Revenue assurance systems replacement phase 1: Revenue Assurance of the Billing Chain

RevenueOffice will monitor each Revenue Stream at each control point defined in each phase, and will provide the following value:

- Monitor properties for each stream e.g. Value, Amount, Duration, Size and compare actual with historical trends
- Track the integrity and Reconcile the Revenue Flow for each Revenue Stream along the chain
- Alarm on issues in the flow (Reconcile) and alarm when compared to the historical profile.
- Provide the ability to drill down through IRR in case of need to pin point to error records.
- Provide Reports on Revenue Stream: these reports can be run on Crystal reports or Business Objects, and are configured from a set of standard templates, divided in four categories:
 - o Revenue Streams: Reconciliation & traffic Analysis, Historical reports, “Warning” Service Type reports
 - o Revenue Assurance Alarms: Number of alarms and revenue loss per alarm category, Number of alarms and revenue loss per alarm status, Recovered revenue report, Summary reports
 - o RevenueOffice™ File processing
 - o RevenueOffice™ System Monitoring

8 IT Integration

8.1 Overview

Vodafone Spain has a relatively mature implementation of Middleware/EAI. Middleware Fenix was developed in 1999 as an in-house developed system operating on TUXEDO technology (C/C++) to provide middleware functions – communications between major systems. TUXEDO is a tool with functionality of transactional monitor. Fenix Middleware is the solution of integration in-house (VF SP) development using the Tuxedo tools and that allows the system integration (EAI) in different levels incorporating a part of the integration logic for service provisioning - an example of its functionality being when a provisioning system needs to create a new user within the CRM system, a trigger is sent to TUXEDO in order to fulfil that request. The provisioning system does not need to know about the final system that creates the user as this is handled within Middleware Fenix.

The last change to the Fenix Middleware core was in 2000. There are two parts to Fenix Middleware – adaptors to systems and a workflow tool to provide the functionality behind requests. To insert a new connection into Fenix Middleware there is no need to change the core – tables are adapted to generate different results from the request.

The use of Fenix Middleware within provisioning grew and grew to the point where an in-house developed system was no longer fit for purpose across all Vodafone Spain systems. Fenix Middleware (based on TUXEDO) currently provides connection points between the following systems:

- Clarify 10.1
- Arbor
- DWH
- Filenet
- ASAP
- Infranet
- NCRM (Clarify 11.5)
- VBU
- POS
- Web applications
- Call Centre applications

The growth of systems resulted in a need for a more powerful tool – the reasons are discussed in more detail in the architectural issues section of this document. TIBCO has now been selected as the strategic middleware tool within Vodafone Spain and now has many implementations. The philosophy of middleware use changes with the move from Fenix Middleware (based on TUXEDO) to TIBCO. With TIBCO, there is an approach towards using master system data. The result is that a Customer Service Agent would not need to know the detail behind BroadVision or any of the underlying system information to retrieve an order.

Currently there are up to 150 systems that have adaptors and connect to TIBCO. There are around 800 domain services also that handle requests.

The web is an extensively used channel within Vodafone Spain. Many different systems have web applications running and a strategic decision has been made to use BEA WebLogic for all web-based applications.

The key points of note on the web architecture are that it is stable and well used – J2EE and webapps have been used for the last 5 years. The development process uses the same development team for the web as well as other web-based applications i.e. new work for the web will be delivered by the same team as the Intranet as CRM tools as Sales tools - all those that are web based and use J2EE on WebLogic.

In VF SP, there are different weblogic server instances and domains for internet, intranet, extranet and call center web applications. Of this way, the applications are separated according to the kind of the application (critical nature, final customers, etc.).

The internet and extranet weblogic instances have access since internet whereas the intranet and callcenter applications have only internal access.

If one application has both intranet and internet visibility, it is deployed in both instances (intranet instance and internet instance). The URL will be different according to the internal (since intranet) or external (since internet) access, nevertheless the interface, data repository, etc. will be the same. Each instance is a weblogic server application instance that is deployed in cluster and in a HA in two physical HP machines.

8.2 High-Level Architecture

The following diagram details how TIBCO and Fenix Middleware fit within the Spain Architecture as Middleware systems.

Fenix Middleware (based on TUXEDO) was the middleware developed initially in 1999. Fenix Middleware only serves provisioning and 10 key areas/systems that connect into it. The strategic decision was made to move away from Fenix Middleware as it is a custom in-house developed system towards TIBCO which has greater scalability and performance. TIBCO has been implemented since 2003 on a project-oriented basis rather than system-oriented. As a new project requires development, a TIBCO adaptor is developed also and the system is connected into the TIBCO bus. The net result is that up to 150 systems now connect with TIBCO, including all of those that connect to Fenix Middleware. Fenix Middleware contains many complicated workflows that include business logic – the migration of these into TIBCO is a complicated process and now project has had the time available to progress this migration – hence the two middleware systems operate in parallel.

The following diagram details how TIBCO handles the interfacing of multiple systems by splitting them across Domain Services. For each system within a functional area (for example ARBOR and Infranet from Billing are detailed in the diagram below), a TIBCO adaptor connects the system to a Domain Services. Domain Services that connect to the TIBCO ‘Red-Box’ are structured according to GITA Level 1 Domain. Each Domain service contains functionality particular to that functional domain. The Domain Service then connects to the TIBCO interdomain which allows cross-functional communication between systems.

The net effect is that a CRM system does not know that it needs to communicate with a particular Billing system – rather that it communicates with the Billing Domain. A separate Domain Service exists for Cross-Functional Domain functionality to handle the functional workflows for cross-domain communication.

This approach helps enforce the CDM (Common Data Model) across domains. By the time the request has been received into the TIBCO interdomain, all domains and services are speaking in the same language. Technology is separated from functionality within TIBCO.

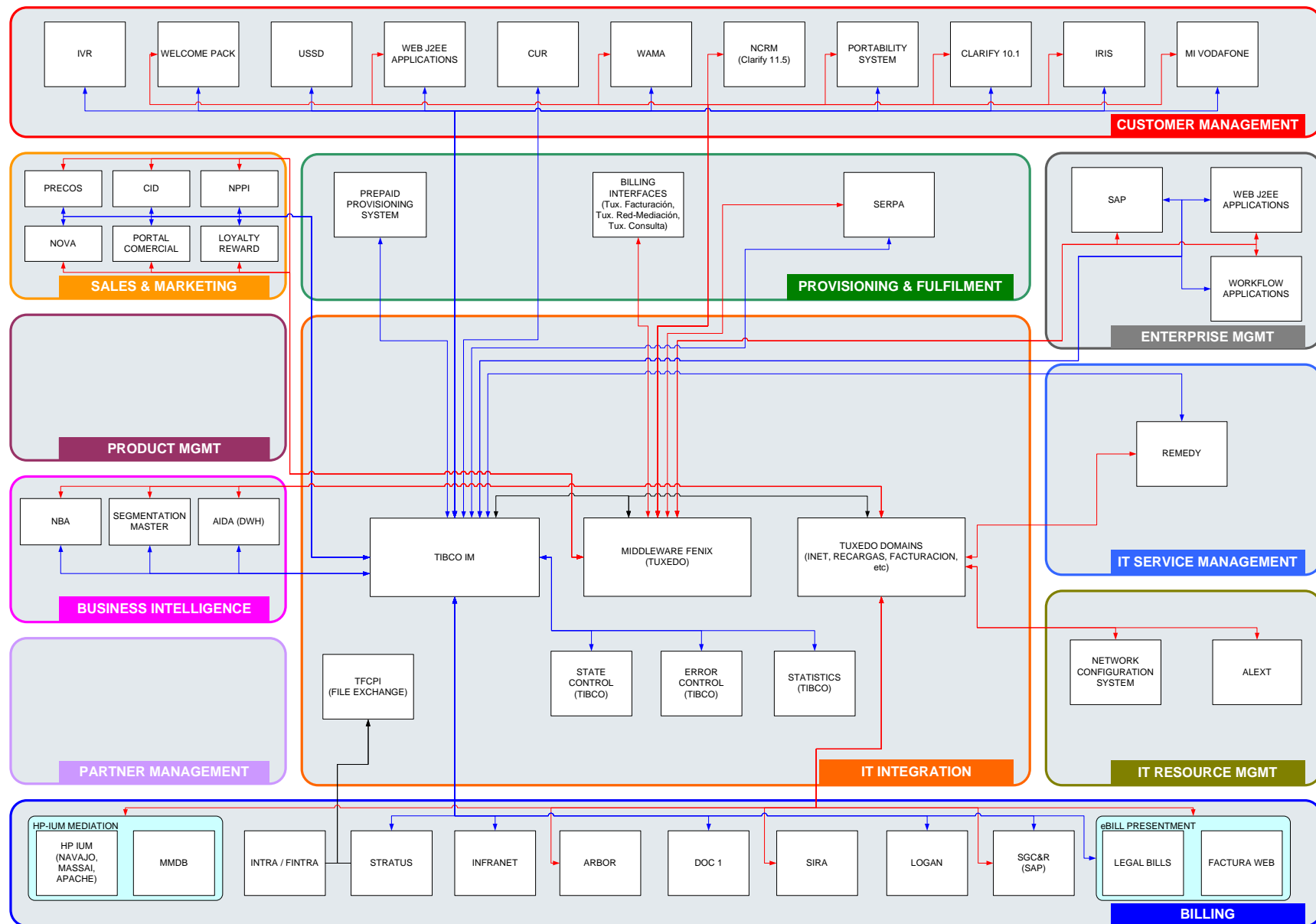


Figure 5 – IT Integration High Level Architecture

8.2.1 System Details

| System | Description |
|-----------------------------|--|
| TIBCO | TIBCO is the tool development platform to deliver in VF SP to integration EAI/BPM. |
| Tuxedo | The Tuxedo Tools are built over several programming libraries that are generated by BEA Systems. Those libraries facilitate the integration with a series of systems across the communication standards or using a communication protocol of the same company |
| Fenix Middleware | Fenix Middleware (based on TUXEDO) was the middleware developed initially in 1999. Fenix Middleware only serves provisioning and 10 key areas/systems that connect into it. |
| Weblogic Application Server | Many different systems have web applications running and a strategic decision has been made to use BEA WebLogic for all web-based applications. |
| TFCPi | Vodafone Spain Employees can interchange files with providers and collaborators through FTP and HTTPS protocols. |
| Vignette | A content management system for publishing and delivering content to the Vodafone website. Currently used for publishing in vodafone.es and other portals or sub-sites. A custom search engine has been developed on top of the Vignette Content Management system in order to allow searching across the web. |

8.2.2 Functional Coverage

GITA L2 functional implementation table:

| Function | Description | Implementation |
|-----------------------------|--|---|
| Application Integration | The key systems exist that allow systems within the Vodafone Spain IT domain to communicate – Fenix Middleware (based on Tuxedo) is the oldest middleware that is being phased out by TIBCO. Also, Point to point integration is used for application / system integration. | Fenix Middleware, TIBCO, Point to Point: - Tuxedo, FIPA, Batch (FTP), JMS |
| Business Process Management | TIBCO is based on a SOA model, therefore, service orchestration and process authorization auto is used in common integration projects. | TIBCO |
| Data Integration | A system is nominated as “master” for each business data. TIBCO SOA services are used for data consults between secondary systems and “master”. Also point to point integration is used for data integration. | TIBCO Point to Point: - Tuxedo, FIPA, Batch (FTP), JMS, JAIN SLEE, Web Services |
| Process Integration | TIBCO is based on a SOA model, therefore, service orchestration and process authorization auto is used in common integration projects. | TIBCO |
| Workflow | A workflow comprises one or more processes that are executed in the context of other processes and/or have human interaction. The workflows are functionality specific such as those in Enterprise Management in Lotus Notes. | No systems Identified for integration (it is just for automated tasks). |

8.3 Key Interactions

The key interactions with TIBCO and TUXEDO are captured elsewhere in this document within each other functional domain. A small view is shown at the following:

| System | Interaction | Via | Notes |
|-------------------------------|--|-------------------------|----------------------|
| TIBCO IM (Integration Domain) | Apolo Pre-paid | Tibco (rv)-CDM | |
| TIBCO IM | ARBOR | Tibco (rv) | |
| TIBCO IM | HP-IUM Mediation | FTP | Batch files |
| TIBCO IM | Infranet | Tibco (rv) | |
| TIBCO IM | CUR | Tibco (rv) | |
| TIBCO IM | Middleware Fenix | Tibco (rv)-CDM/Tuxedo | |
| TIBCO IM | NCRM (Clarify 11.5) | Tibco (rv) | |
| TIBCO IM | SAP (R/3) | Tibco (rv) | |
| TIBCO IM | Web J2EE Apps | Tibco (rv) | |
| TIBCO IM | WorkFlow Apps | Tibco (rv) | |
| TIBCO IM | SERPA | Tibco (rv) | |
| TIBCO IM | Gestor Estados Tibco (Tibco Status manager) | Tibco (rv) | |
| TIBCO IM | Gestor Errores Tibco (Tibco Error manager) | Tibco (rv) | |
| TIBCO IM | Gestor Estadísticas Tibco (Tibco Statistics manager) | Tibco (rv) | |
| Middleware Fenix | WorkFlow Apps | Tuxedo | |
| Middleware Fenix | Web J2EE Apps | Tuxedo | |
| Middleware Fenix | Clarify 10.1 | Tuxedo | |
| Middleware Fenix | TIBCO IM | Tuxedo / Tibco (rv)-CDM | |
| Middleware Fenix | SERPA | Tuxedo | Network Provisioning |
| Middleware Fenix | SERPA | FTP | Batch files |
| Middleware Fenix | BILLING INTERFACES (Tux. Facturación, Tux. Red-Mediación, Tux. Consulta) | Tuxedo | |
| Middleware Fenix | Tuxedo domains (Tux. AC, Inet, Pagos, CRM, NCR, SDI, etc.) | Tuxedo | |

The key items of note are that:

- Fenix Middleware (based on Tuxedo) has older integrations (both with current systems and older systems) and is used to access these systems and for post-paid provisioning
- TIBCO has connections for almost every other relevant system in the architecture – up to 150 systems. As new systems are developed they are connected to the TIBCO hub and exposed to other systems.
- ‘Reusability’: TIBCO follows a SOA architecture. The tendency is that the services can be re-used and therefore, to reduce the time-to-market.
- ‘Complexity’: As the Fenix Middleware system has not been moved to TIBCO completely, the two systems have to live together necessarily. As a result the architecture has become much more complicated. In order to mitigate the complexity, a new project is being implemented (X Project), where quick wins (i.e.: to fix quickly cross middleware incidences) and actions points (i.e.: the roadmap of the EAI architecture evolution).

8.4 Planned Changes and Known Architectural Issues

The integration VF SP business needs are caused by the necessity of the constant change in the telecommunication business, the great quantity of different applications and information repositories that there are in the IT area that need integration systems that optimize its management.

In 1999, Fenix Middleware (based on Tuxedo) was deployed as a middleware. After that, it is used as a EAI as well. However, in order to implement a BPM architecture, Fenix Middleware was not enough and

TIBCO was chosen at the end of 2002 and it is implemented like a middleware, EAI and BPM; coexisting with Fenix Middleware, although several Tuxedo domains have been already migrated to TIBCO.

Because of that, the current integration VF SP architecture is a complex and heterogeneous model. The aim is to use Tuxedo as a transactional monitor and application development server/environment. As the same way, to use EAI TIBCO as a service oriented integration platform, BPM (Business Process Management) and business optimization.

The use of middleware is a mature concept within Vodafone Spain. Fenix Middleware was developed in-house to act as a middleware solution in 1999. As the number of systems and complexity of their functions grew, an in-house developed system was not suitably scalable in a larger network of systems. The key issues that prompted a move away from TUXEDO were:

- A lack of tools. To create a new workflow within the system requires a database change which is not practical.
- No out of the box adaptors. As more systems require connection into TUXEDO, the development effort for adaptors would grow also.
- No real time availability. As a system changes, the adaptors need to alter also, increasing the amount of development effort.
- Complexity. The TUXEDO data model has grown and grown to the point where it is now increasingly complex and difficult to support.

TUXEDO operates satisfactorily – however it does not provide the flexibility required of a strategic solution.

The criteria that TIBCO was selected on ahead of WebMethods and WebLogic Integrator were:

- Integration, Scalability, Cost, Support, Security, Development, Performance and Process Manager.

Next steps

The following tasks are currently planned and scheduled for the growth and increase in the use of TIBCO as the strategic middleware. As new systems are developed there is a need to add adaptors into TIBCO and expose the new systems to the middleware bus.

Once the Apolo project for the migration of pre-paid provisioning onto TIBCO is finished then there is a need to begin to look at migrating the TUXEDO held functionality (workflows) over into TIBCO

New work is still ongoing within Tuxedo due to the functionality wrapped up within it. Changes to existing workflows and systems there require ongoing maintenance and where functionality is only delivered via TUXEDO, new work is added to that system also.

The already finished DCC (Data Centre Consolidation) project carried out following general criteria defined for distribution of TIBCO components between datacenters, that are already in use for different datacentres of VF-Spain. The migration of systems to Italia is not implying a change nor a different approach to TIBCO physical architecture. As individual systems move Data Centres, there is a criteria that when the majority have moved to a different centre that the TIBCO adaptor and Domain service is moved to the same physical data centre. This will result in optimal use of network resources.

Currently Integration Manager (IM) is used as a workflow tool. Although IM is still supported by TIBCO, it is not improved from version 5.0.

As the Business Works (BW) is a more powerful tool and the TIBCO IM and Active Enterprise evolution, the BW implementation project has been already started. Early implementations of TIBCO at Vodafone Spain saw too much functionality and business logic placed within TIBCO. As a result there is a piece of work required to ‘clean-up’ TIBCO and apply lessons learnt with TIBCO onto the first 2 years of implementation.

Other technologies for implementing point to point integration are also used, such as:

- Web Services.
- FTP for batch processes.
- JAIN SLEE.
- JMS

9 IT Resource Management

9.1 Overview

A variety of independent systems cover the IT Resource Management functional domain.

The core is the CdR system (Network Configuration System) that is the physical and logical inventory and tracing of the network. Around this core, it is the Aracne system (it is one of the GIS – Genamap – systems), and connected (vía FTP or Tuxedo) to CdR and Aracne, there are about 40 systems for network.

These 40 systems are grouped per functionality. At the following, some of them are listed:

ECON (economic) Systems:

- Actas Aceptación (Module acceptance minutes).
- HdP (Herramienta de gestión de Pedidos: Purchase tool)
- SPI, etc.

Operative Systems:

- Remedy.
- Tasks management, etc.

Management Systems:

- Web CRI
- STP
- Agora
- Archivo digital
- Argos, etc.

GIS (Genamap) Systems:

- Friendlies
- NCV
- Sugar, etc.

Network Parameters Systems:

- Rainbow
- POL (Pera on-line)
- Sombra
- Tindaya
- Direccionamiento IP, etc.

9.2 High-Level Architecture

The most of these independent systems are all detailed below.

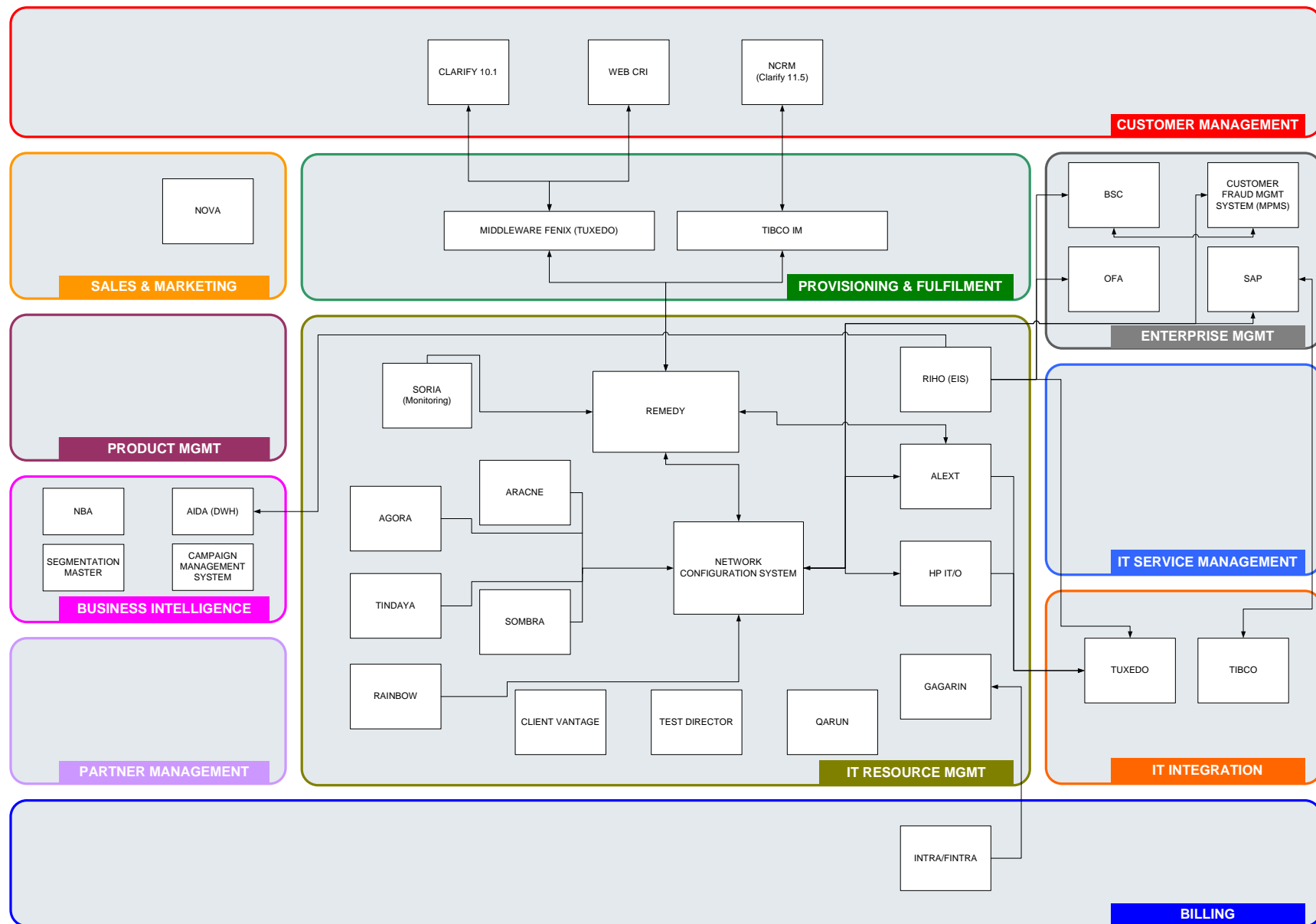


Figure 6 – IT Resource Management High Level Architecture

9.2.1 System Details

| System | Description |
|------------------------------|---|
| Remedy | A trouble management ticketing system. See reference in the IT Service Management section of this document for further information. |
| Network Configuration System | Configuration Management tool that allows configuration of various network devices. |
| HP IT/O | HP OpenView IT/Operations provides operation support and monitoring for servers. |
| Client Vantage | A tool for providing diagnostic data to narrow down the cause of application performance problems. |
| Alext | Management of the intrusion alarms and registration of the interventions in the VF network. |
| EIS/RIHO Database | A database that holds information relating to key KPIs. Information held on how the KPI is calculated, where it comes from and what constitutes it. |
| QARun | An automated test tool. |
| TestDirector | System for managing requirements through to test – storage of requirements, test plans, test cycles and logging of status. |
| Aracne | Network layout tool |
| Gagarin | Application to manage network statistics for Network Quality Department. |
| AGORA | Network sites management |
| SOMBRA | Application to audit and management network BSCs configuration. It's a network tool to manage Nodes, BTSs... it's a J2EE application. |
| Rainbow | Tool for network optimization. (BTSs and BSCs) |
| Tindaya | Tool to update parameters on Interfaces between the RNCs and the B Nodes |
| Soria | Monitoring Tool |

9.2.2 Functional Coverage

GITA L2 functional implementation table:

| Function | Description | Implementation |
|--------------------------|---|--|
| Configuration Management | Remedy is used as a trouble ticketing tool for requesting and progressing configuration changes. NCS actually manages changes. | Remedy Network Configuration System SOMBRA |
| Fault Management | HP IT/O helps identifies faults within IT Resources – particularly servers. | HP IT/O |
| Inventory Management | NCS is a configuration tool that keeps and inventory of all network setups and tracks their changes. | Network Configuration System |
| Network Planning | It provides the functions to support the definition of strategies for providing Bearer Services based on GSM, GPRS, UMTS and Data network features to the required level of utilisation. No systems current exist for this. | Rainbow |
| Operations Management | HP IT/O is used for monitoring of all servers. | HP IT/O |
| Performance Management | Client Vantage is a performance monitoring tool. RIHO is included in this list as it covers the information for | Client Vantage EIS/RIHO Database |

| Function | Description | Implementation |
|-------------------|--|-----------------------|
| | KPIs generation. | |
| System Management | Server and Storage Management, Desktop Management, Backup System Management. No systems current exist for this. | No systems specified |
| System Planning | Supports System planners in an architectural manner by providing guidelines, paradigms, principles, roadmaps, strategies and architectures for System Planning. No systems current exist for this. | No systems specified |
| Technical Support | Remedy is used in order to raise tickets and monitor their progress. | Remedy |
| Testing | Two test products have been identified – QARun for automatic testing and TestDirector for test management. | QARun TestDirector |

9.3 Key Interactions

| System | Interaction | Via | Notes |
|------------------------------|---|----------------------------------|------------------------------|
| Remedy | Configuración de Red (Network Configuration System) | FTP | |
| Remedy | Argos | FTP | |
| Remedy | SORIA | FTP | |
| Remedy | GSP | FTP | |
| Remedy | Gestor de Tareas | Tuxedo | |
| Remedy | NCRM (Clarify 11.5) | Tibco IM | |
| Remedy | Clarify 10.1 | Tuxedo (Middleware Fenix) | |
| Remedy | Web CRI | Tuxedo Tuxedo (Middleware Fenix) | |
| Remedy | Configuración de Red (Network Configuration System) | FTP | |
| Remedy | BSC | FTP | |
| Remedy | DWH | FTP | SFTP File from Remedy to DWH |
| Remedy | Alext | Tuxedo | |
| Network Configuration System | HP IT/O | FTP | |
| Network Configuration System | Alext | Tuxedo | |
| Network Configuration System | SAP (SAP FI) | Tuxedo /Tibco | |
| Network Configuration System | BSC (Balanced Scorecard) | FTP | |
| Network Configuration System | NCRM (Clarify 11.5) | Tuxedo/Tibco (rv)-CDM | |
| Network Configuration | Fraud System (HPFMS) | FTP | |

| System | Interaction | Via | Notes |
|------------------------------|--|---------------|-------|
| System | | | |
| Network Configuration System | Rainbow | Tuxedo | |
| Network Configuration System | Tindaya | Tuxedo | |
| Network Configuration System | Aracne (GIS) | Tuxedo | |
| Network Configuration System | Agora | Tuxedo | |
| Network Configuration System | Sombra | Tuxedo | |
| Network Configuration System | Web CRI | Tuxedo | |
| Network Configuration System | ARGOS | Tuxedo | |
| Network Configuration System | SPI | Tuxedo | |
| Network Configuration System | Rainbow | Tuxedo | |
| Network Configuration System | Actas Aceptación (Module acceptance minutes) | Tuxedo | |
| Network Configuration System | HdP (Herramienta de gestión de Pedidos: Purchase tool) | Tuxedo | |
| RIHO (EIS) | DWH | FTP | |
| RIHO (EIS) | BSC | Others (JDBC) | |
| RIHO (EIS) | SAP | FTP | |
| RIHO (EIS) | OFA | FTP | |
| Alext | Argos | Tuxedo | |
| HP IT/O | BSC | Others (SNMP) | |
| HP IT/O | Campaign Management System | Others (SNMP) | |
| HP IT/O | NBA | Others (SNMP) | |
| HP IT/O | NOVA | Others (SNMP) | |
| HP IT/O | Segmentation Master | Others (SNMP) | |
| Gagarin | INTRA/FINTRA | FTP | |

9.4 Planned Changes and Known Architectural Issues

No planned changes in the short-term.

10 IT Service management

10.1 Overview

All IT Service Management is managed through Remedy.

Remedy is configured to operate two separate systems – as detailed above some functionality covers IT Resource Management regarding Network issues and change requests. The remaining functionality is used for classic trouble ticketing purposes to manage issues and change requests across a variety of internal systems.

10.2 High-Level Architecture

These independent systems are all detailed below.

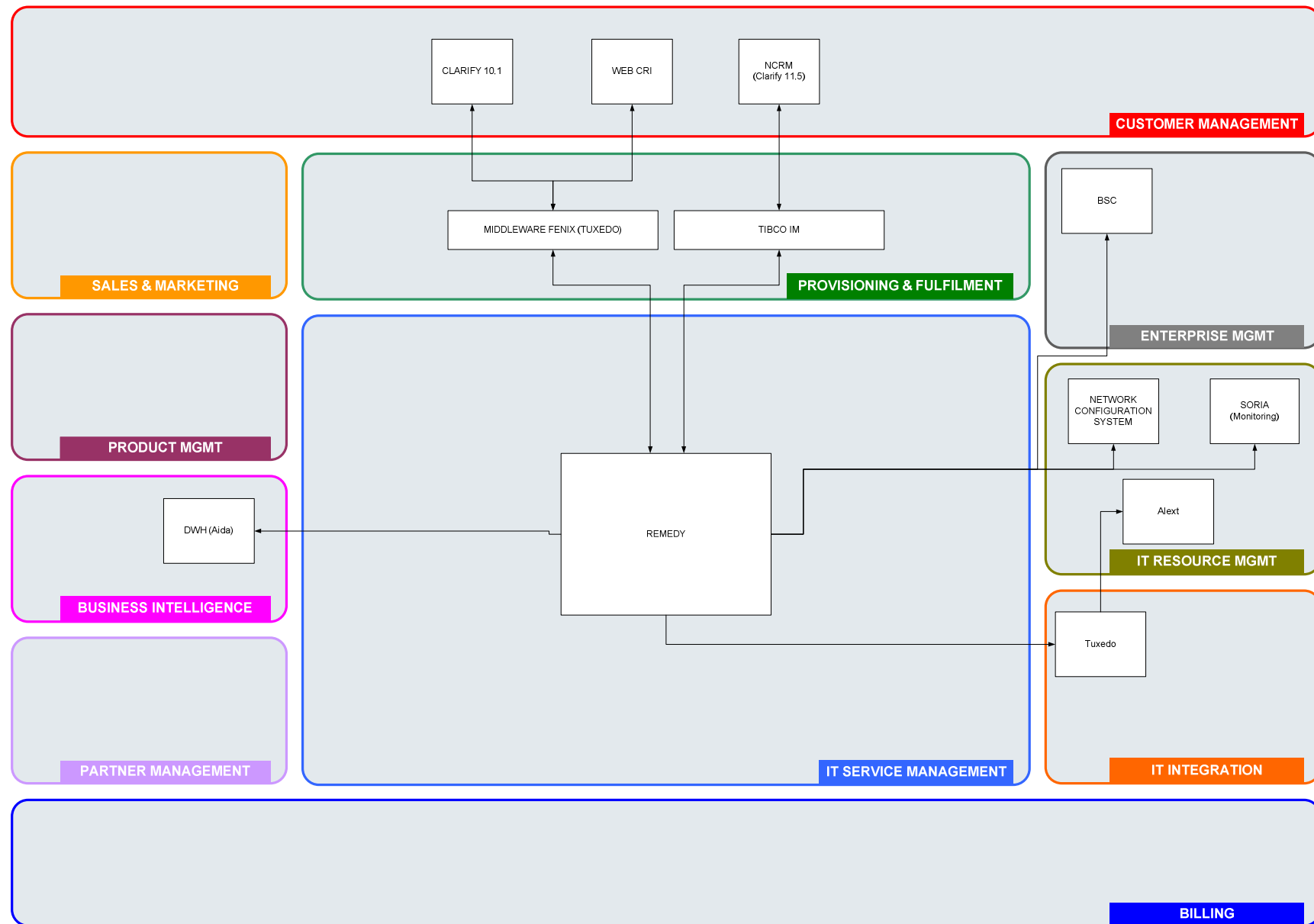


Figure 7 – IT Service Management High Level Architecture

10.2.1 System Details

| System | Description |
|--------|--|
| Remedy | Remedy is the platform that supports two VF-ES applications: HERMES and NAS. HERMES is the tool use by the HelpDesk Team to manage issues of employees and other internal users. NAS is the tool used to manage network issues and change requests. It is a Trouble Ticketing and change management tool. |

10.2.2 Functional Coverage

GITA L2 functional implementation table:

| Function | Description | Implementation |
|----------------------------------|---|----------------|
| Application Administration | From GITA : Traces the execution of registered/hosted applications to check performances and availability; it also supplies to Vodafone and third party administrators with operational statistics and diagnostics tools. | Remedy |
| Service Administration | From GITA : Service Administration deals with support functions that ensure that services are performed, the network is used efficiently, and prescribed service-quality objectives are met. | Remedy |
| Service Assurance Management | From GITA : This area covers functionality required to support the Service Assurance functional area, including monitoring of Service alarms as well as provision of means to recovery a fault on a service. | Remedy |
| Service Configuration Management | From GITA : This application area covers the configuration, presentation and control of services utilising the capabilities of both the networks and service platforms. | Remedy |
| Service Lifecycle Management | From GITA : Functionality supporting service creation, maintenance, migration and eventual retirement of services. | Remedy |
| Service Planning | From GITA : Service Planning delivers and develops service plans in support of products and offers that include volume forecasts, negotiation for required levels of resources, gaining service development and management as well as supply chain commitment and executive approval for the plans | Remedy |
| Service Quality Management | From GITA : This area covers the functionality required to monitor and evaluate service performance: per service (continuous) per service instance (on request) all the services offered to a certain customer (on request). It also includes the capability to evaluate and analyse service quality levels and to compare them with target | Remedy |

| Function | Description | Implementation |
|----------|---|----------------|
| | values (as defined by a SLA), generating warnings and alarms when needed. | |

10.3 Key Interactions

| System | Interaction | Via | Notes |
|--------|---|----------------------------------|------------------------------|
| Remedy | Configuración de Red (Network Configuration System) | FTP | |
| Remedy | Argos | FTP | |
| Remedy | SORIA | FTP | |
| Remedy | GSP | FTP | |
| Remedy | Gestor de Tareas | Tuxedo | |
| Remedy | NCRM (Clarify 11.5) | Tibco IM | |
| Remedy | Clarify 10.1 | Tuxedo (Middleware Fenix) | |
| Remedy | Alext | Tuxedo | |
| Remedy | BSC | FTP | |
| Remedy | DWH | FTP | SFTP File from Remedy to DWH |
| Remedy | Web CRI | Tuxedo Tuxedo (Middleware Fenix) | |

10.4 Planned Changes and Known Architectural Issues

No planned changes in the short-term.

11 Partner Management

11.1 Overview

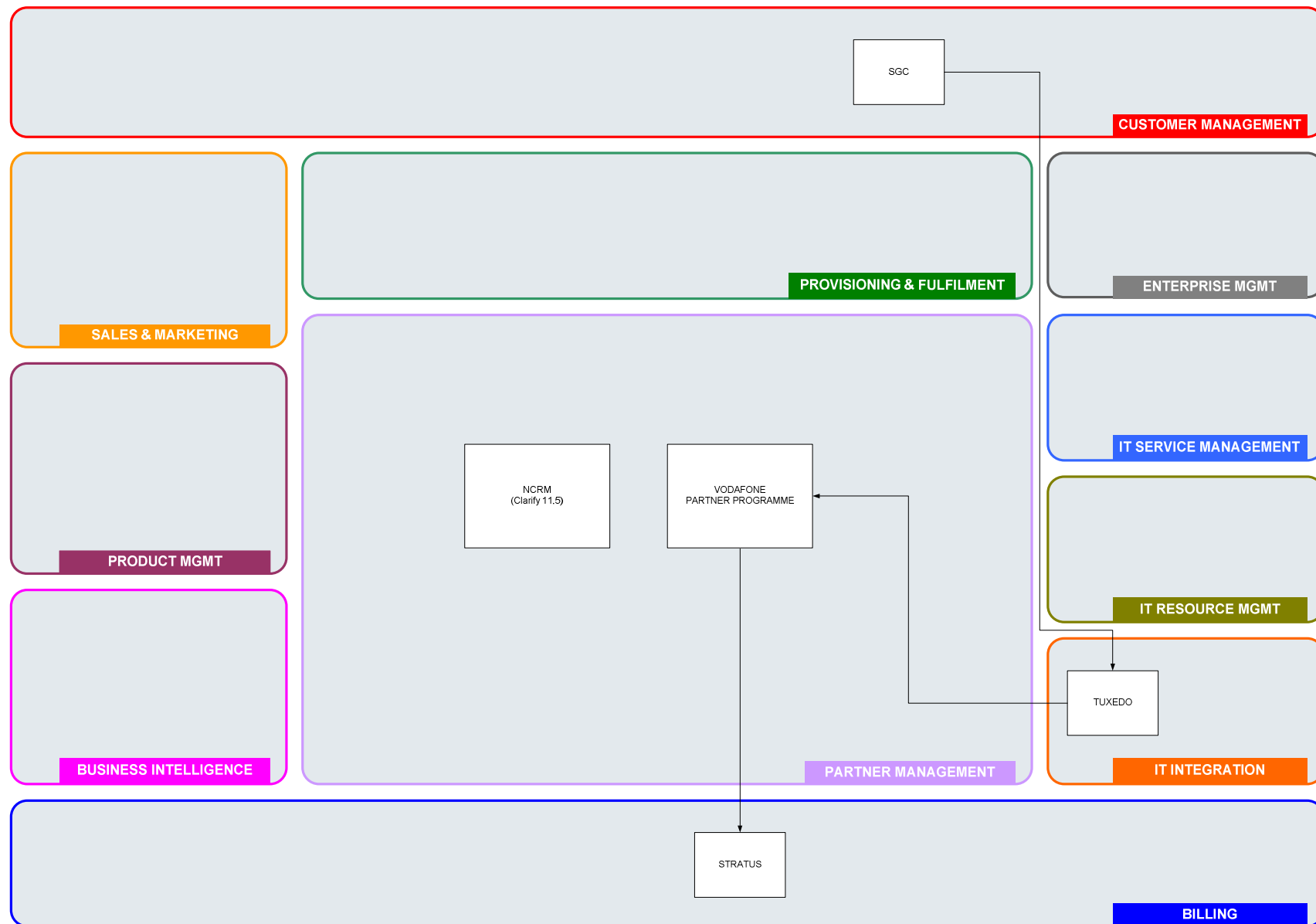
NCRM – New Customer Relationship Management is the central system for Partner Management.

NCRM runs on Clarify 11.5 and its overview and key interaction are detailed within the Customer Management section of this document, although the functionality oriented to Partner Management is managed manually.

Besides, there is a portal oriented to VF-Spain Partners called VF Partner Programme Portal.

11.2 High-Level Architecture

These independent systems are all detailed below.

**Figure 8 – Partner Management High Level Architecture**

11.2.1 System Details

| System | Description |
|----------------------|---|
| NCRM (Clarify 11.5) | New Customer Relationship Management – built on Clarify 11.5. See reference within Customer Management section of this document. |
| VF Partner Programme | Portal oriented to VF-Spain Partners |

11.2.2 Functional Coverage

GITA L2 functional implementation table:

| Function | Description | Implementation |
|---|---|---|
| Partner Contact Management | Is responsible for capturing Partner requests and needs as manifested within the context of one or more interactions with Vodafone and for initiating internally driven communications with the Partner, including inbound and outbound marketing campaigns, for activating and managing the proper activity plans to fulfil the Partner's need and for interacting with the Contact Channel Management logical system component to establish the communication with Partner. | NCRM (Clarify 11.5) VF Partner Programme |
| Partner Contract Management | For direct sales channel partners, establishment of sales channels, definition of performance metrics and reward programs for direct sales, administration of support tools for the sales force. | No systems identified |
| Partner Interface Management | Defines and maintains automated and manual interfaces and connections with Partners. | No systems identified |
| Partner Order Capture and Validation | Is responsible for capturing and validating orders for Vodafone products & services from Customers. | No systems identified |
| Partner Resource Management and Reporting | Supports CRM managers in capacity planning and performance analysis specifically for Partners. | NCRM (Clarify 11.5) |
| Partner Risk and Credit Management | Manages the initial assessment of the Partner's financial risk, and its change over time. Its responsible for defining credit limits and performing credit verification. | No systems identified |
| Partner SLA and Quality Management | Manages the service level agreement and service quality promises made to Partners as part of their contract or agreement with the company. | NCRM (Clarify 11.5) |
| Partner Trouble Management | Analyse Partner trouble report. Forward the trouble ticket to the appropriate department. Make regular enquiries on progress of trouble ticket. Liaise with other departments to investigate and fix Partner complaints. | NCRM (Clarify 11.5) |

11.3 Key Interactions

The key interactions for NCRM are detailed in the Customer Management section of this document. although the functionality oriented to Partner Management is managed manually.

| System | Interaction | Via | Notes |
|----------------------|---------------------------------|--------|---|
| VF Partner Programme | SGC (Sistema Gestión de Claves) | Tuxedo | Partner validation in the VF Partner Programme Portal |
| VF Partner Programme | Stratus | FTP | |

11.4 Planned Changes and Known Architectural Issues

The Roadmap for NCRM (Clarify 11.5) is detailed within the Customer Management section of this document.

12 Product Management

12.1 Overview

Product Management is handled by a variety of systems that manage different functionality as their core task but also necessarily manage a product catalogue to enable them to deliver the functionality.

The Product Catalogues can be split across two domains – Billing and Provisioning. These can also be split further across service – pre-paid and post-paid.

The Billing systems need to rate usage against a product catalogue that holds information such as price plans, discounts and usage information for different services such as Voice, GPRS, MMS and SMS.

The Provisioning systems need to actual provision, activate and fulfil different products. As a result, each provisioning system tends to store Product Catalogue information.

Therefore, in VF SP, the commercial catalogue (Product Catalogue) is defined in Clarify 10.1 for post-paid customers, whereas the commercial catalogue for pre-paid customers is Apolo catalogue system and the Billing Catalogue is in Arbor.

The product catalogue in Clarify 10.1 has the products, the services and the kind of relationships among both of them (product & services) that can be defined in Clarify 10.1 for post-paid customers.

The main items in the Clarify product catalogue are:

- Price Plans.
- Discounts
- Promotions
- Solutions.

NPPI plays the role of the catalogue for products with promotions (both for pre&post-paid customers).

Pre-Paid and Post-Paid are obviously handled by different systems – as a result, Product Catalogue information for both is stored in different locations.

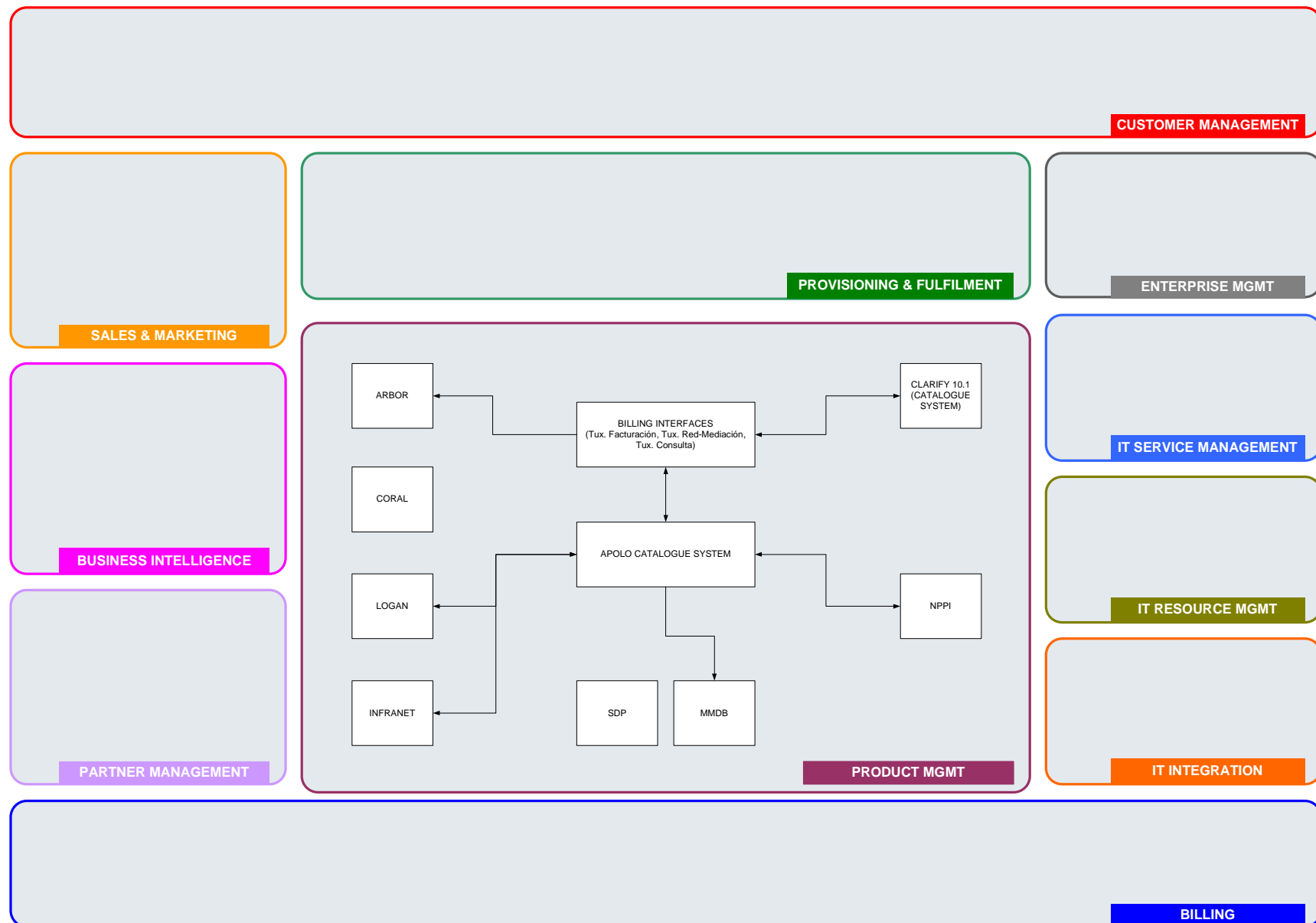
SIM cards catalogue is managed by an in house development (IHD) over Clarify 10.1.

Phone catalogue is managed by SAP Logistic module.

A new functionality, named CALCO, is offered to customers since September 2006. CALCO allows the usage of variable subscription charges for products.

12.2 High-Level Architecture

These variety of systems are all detailed below.

**Figure 9 – Product Management High Level Architecture**

12.2.1 System Details

| System | Description |
|---|--|
| Apolo Catalogue System | Apolo is the programme to deliver pre-paid provisioning functionality. As part of this work, there is a separate Apollo pre-paid product catalogue to enable provisioning. See reference in the Provisioning & Fulfilment of this document. |
| ARBOR (Catalogue) | A rating and billing system that necessarily requires Product details in order to rate correctly. See reference in the Billing Section of this document. |
| Clarify 10.1 (Catalogue System) | Clarify 10.1 manages post-paid provisioning. See reference in the Provisioning & Fulfilment of this document. |
| CORAL (Catalogue) | CORAL is the Prepaid SDPs Charging Gateway that holds the current balance for pre-paid users. See reference in the Billing Section of this document. |
| Infranet (Catalogue) | A rating and billing system that necessarily requires Product details in order to rate correctly. See reference in the Billing Section of this document. |
| MMDB (Catalogue) | A mediation system. A product catalogue is used in order to correctly distribute the relevant records to the correct Rating system. See reference in the Billing Section of this document. |
| NPPI (Catalogue) | Nueva Plataforma de Promociones Integrada: promotions platform that manages post-paid promotions and pre-paid on-line promotions. A product catalogue is used to manage promotions. See reference in the Sales & Marketing Section of this document. |
| LOGAN (Catalogue) | A rating system that necessarily requires Product details in order to rate correctly. See reference in the Rating Section of this document. |
| SDP (Catalogue) | SDP holds the current balance for pre-paid users. Interfacing with the network for decrementing the balance and SIRA for updating with top-ups, product details are held within the system. See reference in the Billing Section of this document. |
| BILLING INTERFACES (Tux. Facturación, Tux. Red-Mediación, Tux. Consulta) | Contains business logic in order to enable post-paid provisioning. See reference in the IT Integration Section of this document. |

12.2.2 Functional Coverage

GITA L2 functional implementation table:

| Function | Description | Implementation |
|------------------------------|--|--|
| Product Catalogue Management | The Product Catalogue Management sub-domain is responsible for the definition and maintenance of the Vodafone OpCo commercial offer. It supports the definition of a product with its characteristics, such as internal name, commercial name, logos, subscription/purchasing rules, contract rules and limitations. The Product Catalogue should cover different kind of dimensions | Billing Interfaces (TUXEDO FACTURACION) HP-IUM (APACHE) Apolo Catalogue System ARBOR Roaming In (10.1) ARBOR 11.8 Clarify 10.1 CORAL Infranet 7.2 LOGAN SDP NPPI |

| Function | Description | Implementation |
|------------------------------|--|-------------------|
| | and be multipurpose (covering different domains or sub-domains such as Billing, Rating, Roaming, Interconnection, Loyalty, Commission, Discount & Promotion). | |
| Product Lifecycle Management | <p>The Product Lifecycle Management sub-domain supports management of products through the lifecycle, from marketing requirements, planning, development, testing, communication, launch, performance monitoring and analysis to retirement.</p> <p>It allows to create new product development projects, to define development plans and budget and to track the product development process stages, associating the actual costs to each stage of the product lifecycle.</p> | No system defined |

12.3 Key Interactions

All systems are detailed in other functional domains and as such their key interactions are captured within those domains.

12.4 Planned Changes and Known Architectural Issues

The fact that there is no single master product catalogue could be seen as an issue but the architecture currently works as-is.

Long term, product catalogues will be moved out current systems. There are high level plans to do this in the new Vodafone Spain Roadmap project.

Clarify 10.1/Middleware Fénix/Apolo prepaid has been highly customised and this will make the upgrade/migration onto a different platform a difficult task.

13 Provisioning and Fulfilment

13.1 Overview

The key provisioning and fulfilment systems are detailed elsewhere in this document due to them sharing functionality with other domains.

Essentially, core provisioning and fulfilment is managed by 2 systems:

- Clarify 10.1 handles the provisioning and fulfilment of post-paid products and services.
- Apolo handles the provisioning and fulfilment of pre-paid products.

Self provisioning is managed by Infranet:

- Infranet manages SVA products provisioning (Infranet does not “manage” provisioning by itself. In many flows it is one more link in the provisioning chain, in others, specially those products that require interaction with the final customer, it handles the logic to provisioning services, but always “inside” the system, i.e., Infranet never goes to an external entity to actually provisioning something. All entries remain within Infranet database and is Infranet that actuates as an authorizer for service requests. Thus, service platforms always requests Infranet clearance previously service delivery).

13.2 High-Level Architecture

Figure below shows a diagram of the whole process and participants.

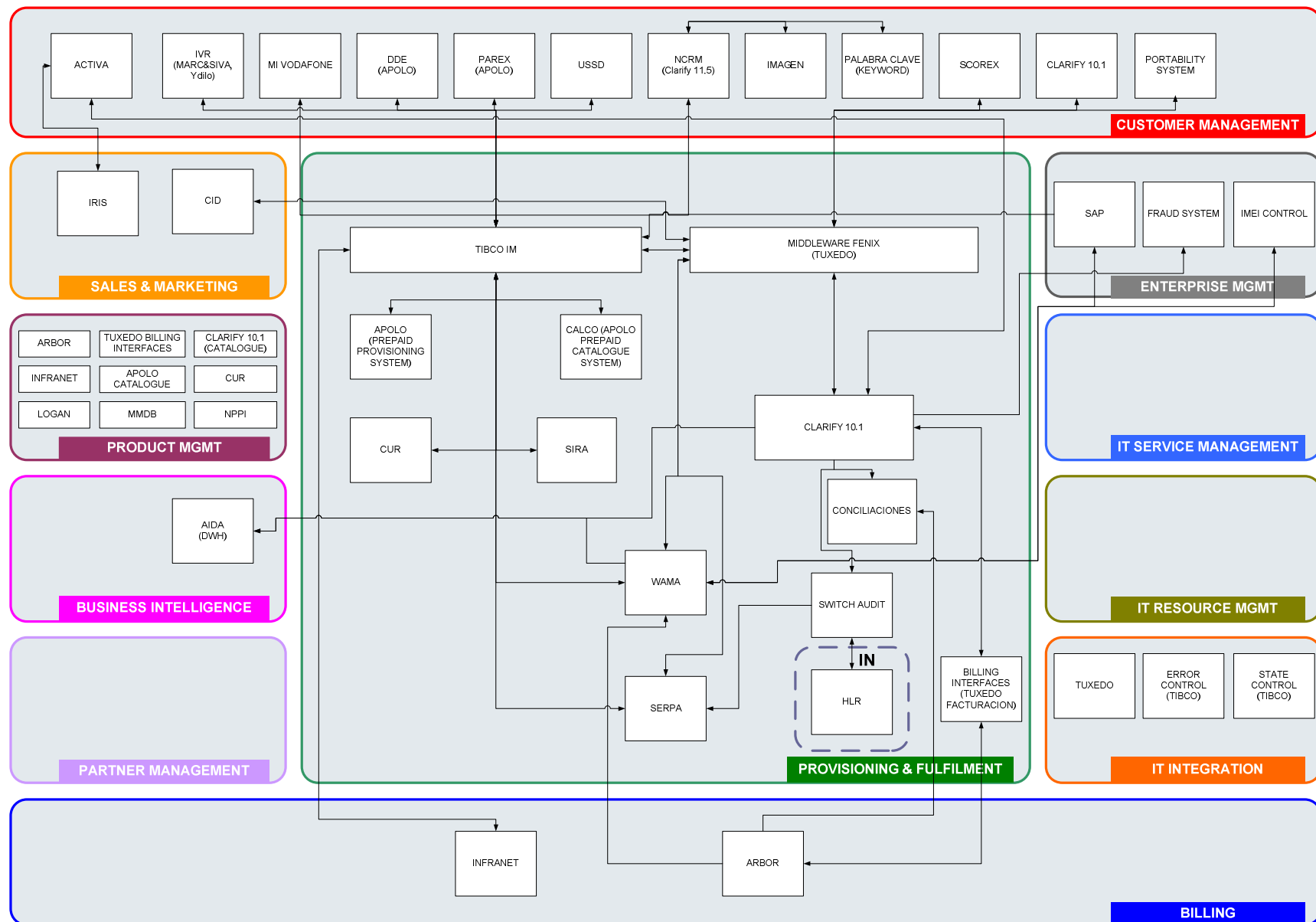


Figure 10 – Provision & Fulfillment High Level Architecture

13.2.1 System Details

| System | Description |
|---|--|
| Prepaid Provisioning System | Pre-paid provisioning logic developed into TIBCO middleware and based on Master Data policy. |
| Clarify 10.1 | Clarify 10.1 handles provisioning and fulfilment front-end for post-paid products. See reference within Customer Management section of this document. |
| Middleware Fénix | Middleware Fénix handles provisioning workflows/processes for post-paid products. See reference within Integration section of this document. |
| Infranet | Infranet manages the provisioning of SVA products. See reference within the Billing section of this document. |
| WAMA | WAMA is the web application that supports the VF-SP post-sales model. It could be used for both residential and corporate customers. It manages handset repairing and replacement lifecycle and SIM card change. Customer's segmentation integration allows a tailored treatment for each customer. The system is also integrated with handset manufacturers and the logistic operators systems. See Customer Management section for further information. |
| SWITCH AUDIT | In-House development that reconciles the subscribers between Clarify 10.1 and the HLR. It corrects in the HLR any customer profile mis-configurations. |
| BILLING INTERFACES (Tux. Facturación, Tux. Red-Mediación, Tux. Consulta) | Not only used as middleware but contains some of the business logic behind provisioning also. Used with Clarify 10.1/Middleware Fenix for post-paid provisioning. |

13.2.2 Functional Coverage

GITA L2 functional implementation table:

| Function | Description | Implementation |
|-----------------------------------|---|--|
| Billing Provisioning | Billing Provisioning is largely managed by Infranet, Tuxedo, Apolo and Clarify 10.1 being the key links for billing activation. | Billing Interfaces (TUXEDO FACTURACION) Apolo Provisioning system Clarify 10.1 Infranet Middleware Fénix |
| Order Fulfilment Coordination | Clarify 10.1 handles order fulfilment provisioning. It also handles post-paid provisioning from a user front-end perspective. | Clarify 10.1 Middleware Fénix |
| Physical Delivery | No systems have been identified that are internal to Vodafone Spain for Physical Delivery – this is externally managed. | No Systems provided |
| Physical Resource Management | Clarify 10.1 is used for Physical Resource Management – stock control, inventory, etc. | Clarify 10.1 |
| Product Implementation Management | Apolo Provisioning System and Provisioning System are provided by the Apolo project (delivered end of Oct 2005). It has not been named yet but transfers pre-paid order provisioning functionality out of Clarify 10.1 and into TIBCO | Apolo Provisioning system Clarify 10.1 Middleware Fénix |
| Provisioning Auditing and | Conciliaciones does auditing | Conciliaciones |

| Function | Description | Implementation |
|----------------------------------|--|---|
| Assurance | functions for Billing provisioning. Switch Audit ensures that customer profiles between Clarify and the network are maintained. | SWITCH AUDIT |
| Subscription Management | Clarify 10.1 maintains customers subscriptions with the CUR also being the master store of customer information. Infranet maintains the information for post-paid subscriptions. | Clarify 10.1 CUR Infranet |
| Technology Resource Provisioning | The Technology Resource Provisioning sub-domain manages the provisioning of technology resources such as network and end-user customer's equipment. | Apolo Provisioning system Clarify 10.1 CUR SERPA SIRA Middleware Fénix |
| Third Party Provisioning | There are no systems identified for provisioning for 3 rd party's. | No Systems provided |
| Virtual Resource Management | Clarify 10.1 covers the management of both Number and SIMs – provisioning for pre-paid and post-paid. | Clarify 10.1 |
| Warranty and Returns | WAMA manages Warranty and Returns functionality. | WAMA |

13.3 Key Interactions

| System | Interaction | Via | Notes |
|--------------------|--|---------------------------------|--|
| Apolo Provisioning | Clarify 10.1 | Tibco/Tuxedo | |
| Apolo Provisioning | Intranet 7.2 | Tibco/Tuxedo | |
| Apolo Provisioning | NCRM (Clarify 11.5) | Tibco/Tuxedo | |
| Apolo Provisioning | Parex | Tibco | |
| Apolo Provisioning | DDE | Tibco | |
| Apolo Provisioning | CUR | Tibco | |
| Apolo Provisioning | SERPA | Tibco | |
| Apolo Provisioning | ARBOR 11.8 | Tibco/Tuxedo | |
| Apolo Provisioning | Apolo Catalogue System | Tibco | |
| Apolo Provisioning | Middleware fénix (TUXEDO FENIX) | Tibco/Tuxedo | |
| Apolo Provisioning | SIRA | Tibco/Tuxedo | |
| Apolo Provisioning | Portability system | Tibco/Tuxedo | |
| CID (Post-paid) | Clarify 10.1 | FTP & Middleware Fénix (Tuxedo) | Create new customers |
| Clarify 10.1 | Middleware Fenix | Tuxedo | Provisioning (post-paid customers) |
| Clarify 10.1 | BILLING INTERFACES (Tux. Facturación, Tux. Red-Mediación, Tux. Consulta) | Tuxedo | Billing provisioning (post-paid customers) |
| Clarify 10.1 | CUR | Middleware Fénix (Tuxedo)/Tibco | -Conversations -Service Checks |
| Clarify 10.1 | CUR | FTP | Daily activations |
| Clarify 10.1 | DDE | Middleware Fénix (Tuxedo)/Tibco | |
| Clarify 10.1 | SERPA | Middleware Fénix (Tuxedo) | Network provisioning |

| System | Interaction | Via | Notes |
|--------------------|---|---|---|
| | | | (network changes) |
| Clarify 10.1 | Scorex | Middleware Fénix (Tuxedo) | Activation validation |
| Clarify 10.1 | SGCYR: System of Collections and Retrievals (SAP R/3) | FTP | Create new customers |
| Clarify 10.1 | SGCYR (SAP R/3) | Tuxedo/ Middleware Fénix (Tuxedo)/ | Actions against the service |
| Clarify 10.1 | NPPI | Tuxedo/Tibco | Clarify 10.1 sends the provisioning events to NPPI and NPPI can provision some products on Clarify 10.1 through Tibco. |
| Clarify 10.1 | Keyword | Middleware Tuxedo / Tibco | Create a new entry in Keyword application when a new customer is created. |
| Clarify 10.1 | Infranet 7.2 | Middleware Fénix (Tuxedo)/Tibco | Bidirectional: - New GPRS customers, actions against the SVA and cycle changes. |
| Clarify 10.1 | DWH | FTP | Customer information |
| Clarify 10.1 | Fraud System (HPFMS) | FTP | Fraud control |
| Clarify 10.1 | NCRM (Clarify 11.5) | Tuxedo / Middleware Fénix (Tuxedo) | Bidirectional: Customer creations and updates |
| Clarify 10.1 | ARBOR 11.8 | Middleware Fénix (Tuxedo) / Billing Interfaces (Tuxedo Facturación) | Bidirectional: Customer creations, updates and erases |
| Clarify 10.1 | Apolo Provisioning system | Tuxedo/Tibco | |
| Clarify 10.1 | SIRA | Tuxedo | Credit consultation and pre-paid top-ups from Clarify 10.1 |
| Clarify 10.1 | MMDB & HP-IUM (Apache, Massai & Navajo) | Middleware Fénix (Tuxedo) | Real postpaid provisioning subscriptions/products (Clarify -> MMDB → VPN Information and pre-paid – post-paid services) (MMDB→Clarify-> 1 st call information) |
| IRIS | Clarify 10.1 | Middleware Fénix (Tuxedo) | Activations |
| IRIS | Activa (Clarify 10.1) | Middleware Fénix (Tuxedo) | Activations |
| PRECOS | SERPA | FTP | It sends the info about card SIMs preassigned with the telephone numbers |
| TIBCO IM | Gestor Errores Tibco (Tibco Error manager) | Tibco | Tibco Error Management for provisioning. |
| TIBCO IM | Gestor Estadísticas Tibco (Tibco Statistics manager) | Tibco | Tibco Statistics Management for provisioning. |
| Portability System | Clarify 10.1 | Middleware Fenix / Tibco | Customer de-activation |
| Portability System | Activa (Clarify 10.1) | Middleware Fenix / Tibco | New customers activation |
| Infranet | TIBCO | Tibco (rv) | Connection from Infranet |

| System | Interaction | Via | Notes |
|----------------------------------|---|-----------------------------------|---|
| | | | on-line Data Manager to Tibco |
| Infranet | Billing Interfaces (Tuxedo Facturación) | Tuxedo | Connection from Intranet on-line Data Manager to Tuxedo |
| NCRM (Clarify 11.5) | TIBCO IM | Tuxedo / Tibco | |
| NCRM (Clarify 11.5) | Clarify 10.1 | Middleware Tuxedo / Tibco + Batch | Bidirectional: Customer creations and updates |
| NCRM (Clarify 11.5) | SERPA | Middleware Tuxedo / Tibco | |
| NCRM (Clarify 11.5) | HLR - HMIG | Middleware Tibco | |
| NCRM (Clarify 11.5) | SDP | Middleware Tibco | NCRM is also a channel, then it accesses to some master systems through Tibco |
| NCRM (Clarify 11.5) | Capture Data | FTP File | |
| NCRM (Clarify 11.5) | Scorex | FTP File | |
| NCRM (Clarify 11.5) | Prepaid promotions application | FTP File | |
| NCRM (Clarify 11.5) | MCP8 | FTP File | |
| NCRM (Clarify 11.5) | CUR | Tibco | -Pricing Plan -Pre-activations -Portabilities |
| WAMA (Post-sales Service System) | Clarify 10.1 | Middleware Tuxedo / Tibco | |
| WAMA (Post-sales Service System) | SERPA | Tuxedo | |
| IVR-Ydilo | Loyalty rewards system | Tuxedo | |
| IVR-Ydilo | Loyalty Points Calculation | Tuxedo | |
| ARBOR | Middleware Fénix (Tuxedo Fenix) | Tuxedo | |
| ARBOR | Billing Interfaces (Tuxedo Facturación) | Tuxedo | |
| CUR | Infranet | Tibco (rv) | |
| ARBOR | Conciliaciones | FTP | Using TCP/IP protocol |
| Conciliaciones | Clarify 10.1 | FTP | |
| My Vodafone | SERPA | Tuxedo / Tibco (rv) | |
| Switch Audit | SERPA | Tuxedo / Tibco (rv) | |
| Switch Audit | Clarify 10.1 | FTP | |

13.4 Planned Changes and Known Architectural Issues

Long term, provisioning and fulfilment will be moved out of Clarify 10.1. There are high level plans to do this in the new Vodafone Spain Roadmap project.

Clarify 10.1/Middleware Fénix has been highly customised and this will make the upgrade/migration onto a different platform a difficult task.

14 Rating

14.1 Overview

There are currently 2 kinds of Rating system implemented within Vodafone Spain. ARBOR is a joint Billing and Rating system (for information on the Billing aspects, see the Billing section of this document).

Infranet is the main rating system within the VF-ES architecture. It performs rating of the following services: MMS, MML, Wap Premium, SMS p2p prepaid and post-paid bundles, WLAN, VF Messenger, Streaming, Vodafone Live!, Chat, Third Party Mngm, Mobipay, Vodafone Mail, SMS premium, MMS premium, Wap Push, Direct MMS, Direct Wap Push, Horizontal Address book, Ring Back Tones, etc, up to around 24 different services.

Infranet is a platform based on events or sessions. The products has the basic functionalities (core) and it has been customized to adapt it to the business requirements such as: Content management, account and service auto-provisioning, promotions, black-lists and restrictions.

Logan is a system used purely for rating functionality for Pre-paid customers. Logan only handles SMS (all but peer-to-peer that is handled by Infranet and Arbor) and GPRS services. The Logan database only contains customers who have purchased bundles. The master user data repository is held within NCRM (Clarify 11.5) and customers who have ordered bundles are fed through into Logan. If a customer has not ordered a bundle, there will be no record of them within Logan.

14.2 High-Level Architecture

Both systems connect into the network via mediation systems such as HP-IUM Mediation and ALGA. See the Billing section for proposals to streamline the mediation platform (all but SMS real-time) into one single HP-IUM Mediation system.

Stratus is the final rating system, performing Revenue Share Calculation functionality.

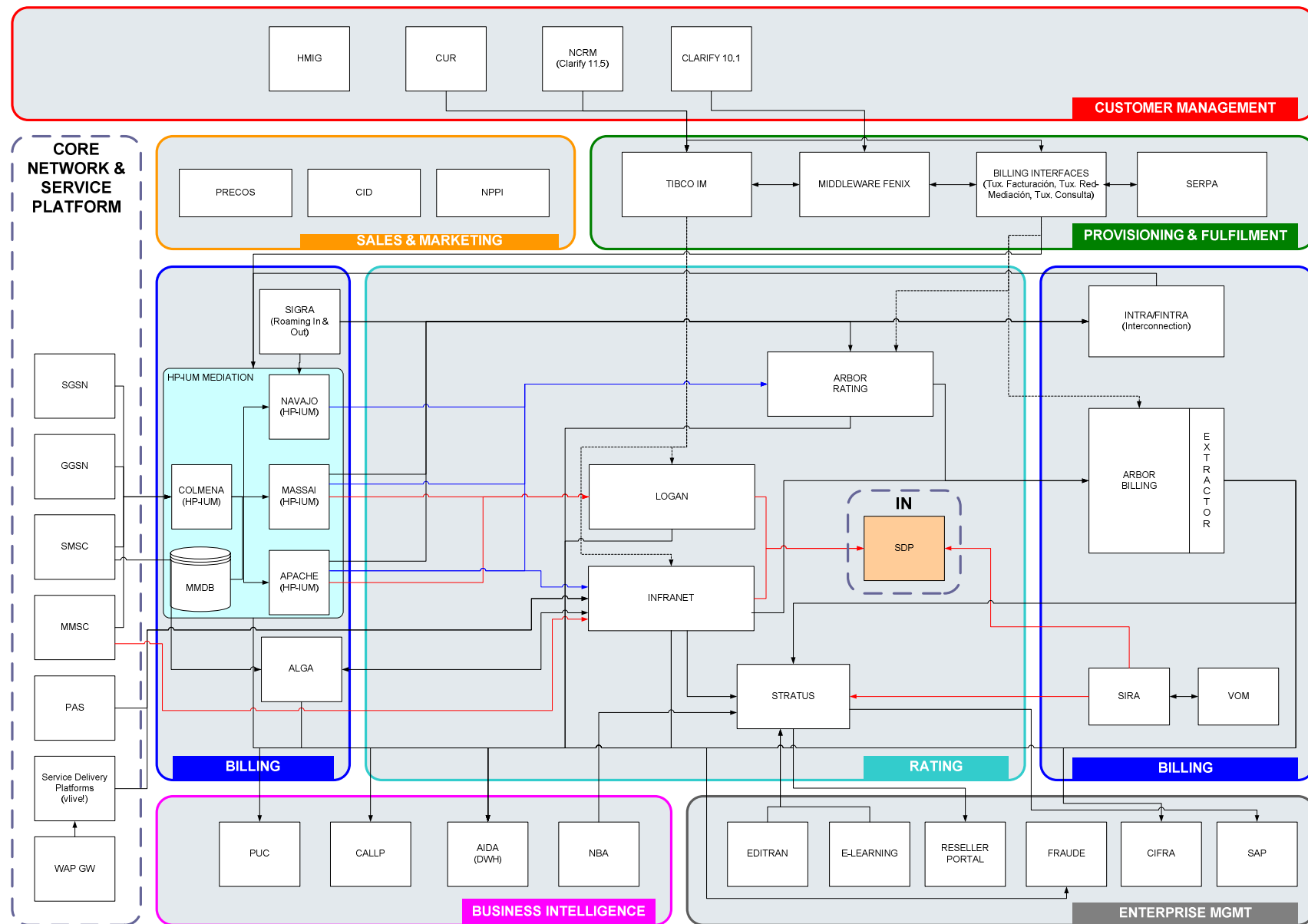


Figure 11 - Rating High Level Architecture

14.2.1 System Details

| System | Description |
|----------|--|
| Stratus | Stratus is a system that performs both the Rating and Billing functions for Revenue Share Calculation. |
| Logan | Logan is a batch Rating system. Logan only provides Rating functionality to pre-paid customers and only for SMS and GPRS services. |
| Infranet | See system details in the Billing section of this document. |
| ARBOR | See system details in the Billing section of this document. |

14.2.2 Functional Coverage

This section describes the functionality as described in the GTAF Framework that the platform supports. GITA L2 functional implementation table:

| Function | Description | Implementation |
|--------------------------------|--|-------------------------------------|
| Payment Transaction Management | Handles payment transactions for service instances. This includes: selection and routing of the payment account (internal or external), seeking payment authorization from account owners and payment performers, issuing advice of charge and advice of debit, performing credit check and debiting the appropriate account. It should also be able to handle payment transactions generated by non-Vodafone applications. | ARBOR 11.8 Infranet 7.2 LOGAN |
| Pricing | Responsible for determining the price for each instance of service delivered to the customer, where 'service' is defined as the specific need of the customer being addressed by Vodafone through that service instance. As a consequence, this also includes setting the price for each component (e.g., bearers, contents, messages, presence, location, etc...) concurring to resolve the service request. There is no fundamental difference between pricing for customers and for third parties. | ARBOR 11.8 Infranet 7.2 LOGAN |
| Revenue Share Calculation | Includes the functions required to calculate the payment due to or from Partners in respect of services delivered. Includes: collection of charge and call records, identification of records relevant to partner charging or revenue share, accumulation and aggregation of records against partner accounts and the calculation of partner charges and revenue share statements. | Stratus |

14.3 Key Interactions

| System | Interaction | Via | Notes |
|----------|--|-------------------------------------|---|
| Logan | HP-IUM Mediation (Apache, Navajo & Massai) | FTP | Incoming into LOGAN |
| Logan | Stratus | FTP | Outgoing from LOGAN |
| Logan | CORAL | Others (FIPA) | Incoming into LOGAN |
| Logan | DWH | FTP | Outgoing from LOGAN |
| Logan | PUC | FTP | Consult pre-paid customers' information |
| Logan | CallP | FTP | Consult pre-paid customers |
| Logan | CUR | Tibco (rv) | Pre-paid customer lifecycle |
| ARBOR | Infranet | FTP | Incoming into ARBOR |
| ARBOR | Clarify 10.1 | TIBCO / TUXEDO | Two-way |
| ARBOR | Doc1 | FTP | Outgoing from ARBOR |
| ARBOR | SAP | FTP | Two-way |
| ARBOR | CID | FTP | Outgoing from ARBOR |
| ARBOR | Sistema de Control CIFRA | FTP | Outgoing from ARBOR |
| ARBOR | Stratus | FTP | Outgoing from ARBOR |
| ARBOR | Sigra | FTP | Incoming into ARBOR |
| ARBOR | DWH | FTP | Outgoing from ARBOR |
| ARBOR | HP-IUM Mediation (Apache, Navajo & Massai) | FTP | Incoming into ARBOR |
| Infranet | ARBOR | FTP | Outgoing from Infranet Infranet sends information about rating, invalid calls, etc. |
| Infranet | CallP | FTP | Outgoing from Infranet Infranet sends information about rating, invalid calls, etc. |
| Infranet | Fraud System (HP-FMS) | FTP | Outgoing from Infranet Infranet sends information about rating, invalid calls, etc. |
| Infranet | DWH | FTP | Outgoing from Infranet Infranet sends information about rating, invalid calls, etc. |
| Infranet | Stratus | TIBCO & FTP | Outgoing from Infranet |
| Infranet | SDP | | Outgoing from Infranet |
| Infranet | CUR | TIBCO & FTP | Two-way. Pre-paid customer lifecycle |
| Infranet | HP-IUM Mediation (Apache, Navajo & Massai) | FTP | Incoming into Infranet |
| Infranet | ALGA | Others (PCP) | Incoming into Infranet. For SMS P2P and Premium MO. |
| Infranet | Service Delivery Platforms | TIBCO, Weblogic, FTP & Others (PCP) | Incoming into Infranet. MobiPay, MMS Premium, Streaming, ER, PA (Resellers lifecycle and contents). |
| Infranet | Clarify 10.1 | Tlibco (rv) /Tuxedo | Two-way. Create, erase and modify price plans and requests (post-paid). |
| Infranet | NCRM (Clarify 11.5) | Tlibco (rv) | Two-way. Create, erase and modify price plans and requests (post-paid). |
| Infranet | CORAL | Others (FIPA) | Connection from Intranet on-line Data Manager to CORAL via FIPA (UDP) protocol. Request to SDP-IN |
| Infranet | TIBCO IM | Tibco (rv) | Connection from Intranet on-line Data |

| System | Interaction | Via | Notes |
|----------|--|----------------------------------|--|
| | | | Manager to Tibco: Wap Premium, Streaming, RBT, VF Messenger and vouchers provisioning (service platforms). |
| Infranet | BILLING INTERFACES (Tux. Facturación, Tux. Red-Mediación, Tux. Consulta) | Tuxedo | Connection from Intranet on-line Data Manager to Tuxedo |
| Infranet | NPPI | FTP | Batch files are sent via FTP. Promotions |
| Infranet | NPPI | Tibco (rv) | On-line connections via Tibco. Promotions |
| Infranet | CIFRA (Control System) | Others (SQL) | Incoming into Infranet |
| Infranet | PUC | FTP | Roaming MMS information of other operators. |
| Infranet | SAP | FTP | For vouchers |
| Infranet | LOGAN | Tibco (rv) | For inactivations. |
| Infranet | Stratus | FTP | |
| Infranet | Middleware Fenix | Tuxedo | |
| Stratus | ARBOR | FTP | Incoming into STRATUS |
| Stratus | LOGAN | FTP | Incoming into STRATUS |
| Stratus | INFRANET | FTP | Incoming into STRATUS |
| Stratus | CLARIFY 10.1 | FTP | Incoming into STRATUS |
| Stratus | RIM Provisioning | FTP | Incoming into STRATUS |
| Stratus | VPP | FTP | Incoming into STRATUS |
| Stratus | NBA | FTP | Incoming into STRATUS |
| Stratus | Content Provider | FTP | Outgoing from STRATUS |
| Stratus | DWH (AIDA) | FTP | Outgoing from STRATUS |
| Stratus | Learning space (employees) | FTP | Two-way |
| Stratus | SAP | FTP | Two-way |
| Stratus | Reseller Portal (Portal de proveedores) | FTP & Others(TFCPI) | Movement is from Stratus into Reseller Portal |
| Stratus | Thrid Parties (Various Externals) | FTP, Others(TFCPI) & Others(EDI) | Various external suppliers who are not financial institutions (e.g. El Corte Ingles who sell top-ups). Two-way interface in a variety of protocols |
| Stratus | SMS | TIBCO | Movement is from Stratus into SMS (SMSC) |
| Stratus | SMS Callback | TIBCO | |
| Stratus | SIRA (Top Ups) | TUXEDO | Two-way interface |
| Stratus | Banks and retails | FTP & Others (EDITRAN) | External banking systems – not internal to Vodafone. Movement is from Banks into Stratus using both FTP and industry standard EDITRAN |
| Stratus | LES | FTP | Two-way interface. LES sends to Stratus the localization events and “hot lines” receptions. |

14.4 Planned Changes and Known Architectural Issues

There are existing issues with the Logan system as it is a Batch system which is far from ideal for a Rating system. The long term plan is to connect Infranet fully up to the Network through HP technology in order to replace Logan. Trials in this area began in early March 2006, with SMS and GPRS is the second service to trial in early January 2007, to be assessed for migration from Logan to Infranet. Around July 2007, it will be a Infranet core re-engineering for platform evolution.

The split of functionality between ARBOR and Infranet is essential due to the fact that ARBOR cannot handle bundles for SMS. ARBOR is a pure off-the-shelf solution and is not customisable. As a result, where functionality demands that alterations to systems are required for products such as SMS bundles, it necessarily has to fit within the Infranet system.

TIBCO has been utilised as middleware where possible but issues have been noticed within the Billing and Rating area regarding its performance. The theory is extremely good – a common language for high volume services but sometimes the volume and complexity can lead to a less efficient, and lower performing, solution. Currently, the TIBCO solution for Rating is complex and a piece of work is underway to assess where it should best be used and where alternative solutions should be looked at.

15 Sales and Marketing

15.1 Overview

Sales & Marketing have a series of systems that, although not standalone, do not form a distinct separate Sales & Marketing function.

The key systems are those that reward sales force, such as CID, and those that issues campaigns and promotions.

15.2 High-Level Architecture

Each individual systems is detailed below.

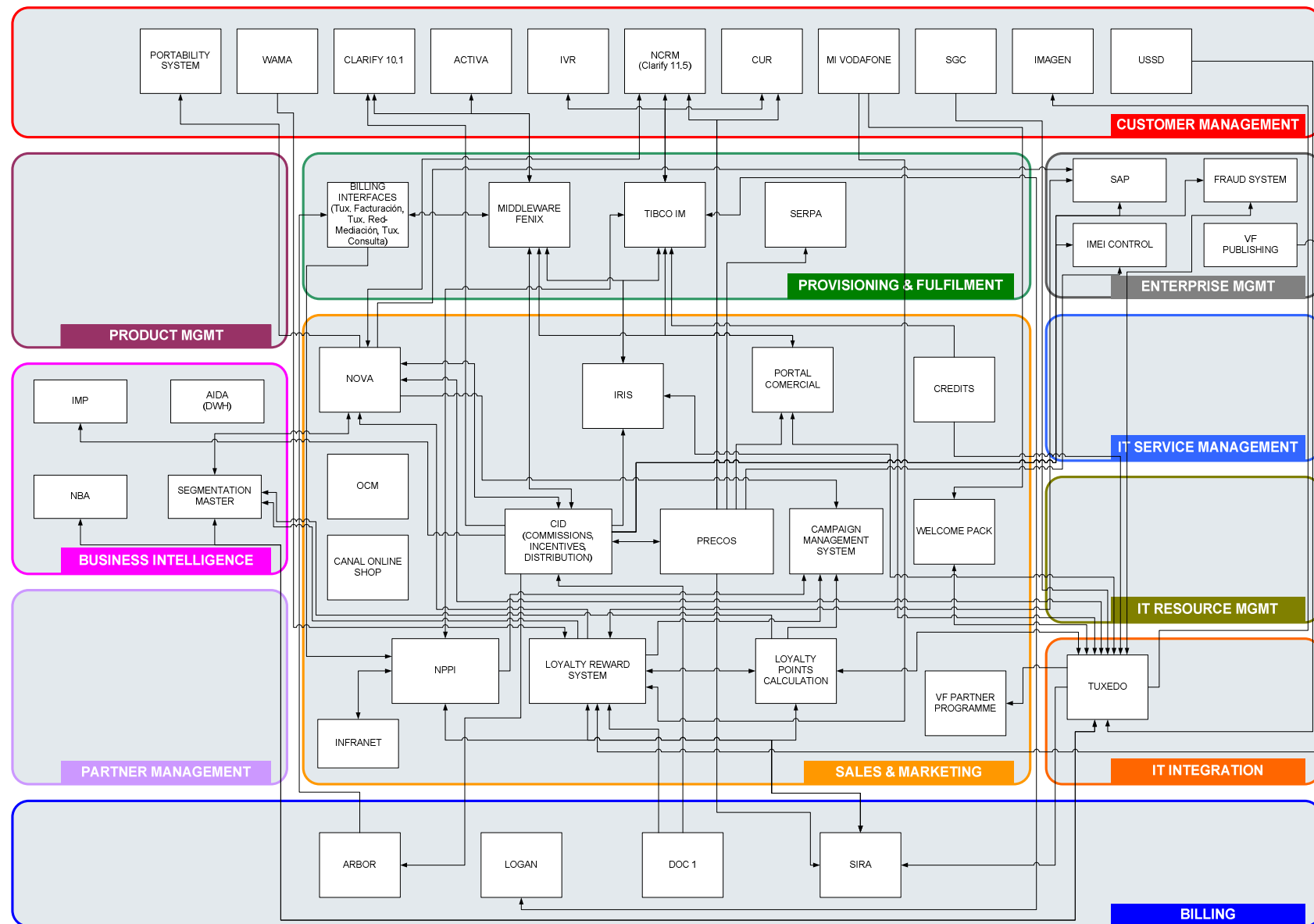


Figure 12 – Sales & Marketing High Level Architecture

15.2.1 System Details

| System | Description |
|--|--|
| CID | Commissions and Incentives Distribution. This system manages the Distributors Master and the particular conditions signed by them. Its main functionalities are: <ul style="list-style-type: none"> • Distribution Master management. • Commissionable events and postpaid customers bill treatment • Calculates the commissions amounts. • Sends SAP the information about the payments to be executed. • Produce reports with the detailed data related to the commissioned events. |
| PRECOS | PRE-paid Commissions System. This system enables the management and follow-up of the prepaid business and commissions related. <ul style="list-style-type: none"> • Stores management, registers the orders and sells. • Stocks management • Calculates commissions. • Reports. • Promotions commissioning. • Management of non-assigned SIM cards • Produces new commissionable events • Stores management per Distributor |
| Prepaid Promotions Application (PPA) | This application manages prepaid promotions and chooses the target customers of each promotion launched. Data files are sent to the applications used to offer them to customers. Interface systems send to PPA the data needed to know the final result of the applied promotions. |
| Commercial Portal | A web-based portal accessible via both Internet and Intranet that covers a wide variety of commercial aspects of sales – activations, sales, after-sales service, commercial targets tracking, commissions, complaints, client lists etc. It is an entry point that triggers work in a variety of back-end systems. |
| Credits | Calculates the credits for the re-sellers in order to enable the re-sellers to apply loyalty policies to the customers. Included in comercial portal. |
| Welcome Pack | Web application to capture personal and demographic data through the use of promotions and vouchers. There are 2 welcome packs, one for prepaid and one for postpaid. The application is accessed from different interfaces and systems, including the call center agents. |
| IRIS | IRIS is a web-based application that allows the Sales Force to submit postpaid contracts into the Vodafone Spain systems for processing. The Sales Force will typically comprise of shops offering Vodafone services and products. IRIS is based on an extranet application – access can be provided to authorised sellers within a matter of minutes enabling the Point of Sale. IRIS runs on WebLogic Application Server 7.0 |
| Loyalty Rewards System (Points Shop) | System that manages the redemption of loyalty points for handsets, bonus and goodies. This systems also provides the user interface (through a J2EE application) to CallCentre CSRs and customers via the Internet. The system is closely coupled with Commercial Portal, NOVA and IVR to enable the purchase of products and services using those loyalty points. |
| Loyalty Points Calculation (Points Engine) | System for managing the customer's loyalty points balance. |
| Canal Online Shop | Online Shop where users (end or new customers) are able to purchase prepaid packs, accessories, etc. This application is based on an outsourced service (located at FullSix facilities). There is also a back-office application (Trastienda) located in VF-Spain infrastructure that allows CallCentre users to create prepaid orders to send them to final customers. This application will be replaced by Canal Online Shop in later releases. |
| NOVA | NOVA is a system that assesses Customer Performance and is used by Sales Force to manage their part of the customers depending on criteria defined by the business. It looks at details for current customers in order to see what ways Vodafone can increase the number of subscriptions. It looks at what customers do in order to help avoid churn – understanding the best areas of the customer base to target particular promotions and |

| System | Description |
|----------|--|
| | campaigns. |
| OCM | Web Application oriented to manage information about campaigns and automate tasks that were executed manually |
| Incentix | Web Application that allows the direct channel to see the details of their activity, manage the incidents with the incentives payments and modify the hierarchy relationships. |

15.2.2 Functional Coverage

GITA L2 functional implementation table:

| Function | Description | Implementation |
|------------------------------|---|---|
| Advertising Management | To support the planning of advertising campaigns. No specific systems identified within the remit of IS. | No Systems Provided |
| Brand Management | To support the strategy and execution of policies related to brand. No specific systems identified within the remit of IS. | No Systems Provided |
| Campaign Management | To support the co-ordination and execution of direct marketing campaigns. All is handled within the Campaign Management System. | Campaign Management System ¹ OCM |
| Commission Management | Management of commissions (be they financial or incentives) for staff. Collection and consolidation of sales data with feeds back into financial systems for distribution of commissions. | CID (Post-paid) Commercial Portal Commissions Precos Incentix |
| Loyalty Programme Management | This area is responsible for information generated through loyalty programmes, managing loyalty balances and handling of redemption of loyalty points. Commercial Portal together with Loyalty Rewards System handles the redemption aspect. Loyalty points calculation handles the balance as well as the activation for pre-paid customers. Welcome Pack controls customer information generated through loyalty programmes | Commercial Portal Loyalty rewards system Welcome pack Loyalty points calculation |
| Marketing Planning | To support the planning of Campaigns. No particular system is used for this though Campaign Management System handles the setup of all Campaigns rather than planning. | No Systems Provided |
| Promotion Management | The definition and rules around a particular promotion. Rules and definition are handled within NPPI – there is then an interface to Infranet to cover off the Billing aspect once a promotion is activated. | NPPI Prepaid Promotions Application (PPA) Infranet 7.2 |

¹ This system is explained more detailed in Business Intelligence section

| Function | Description | Implementation |
|----------------------|--|--|
| Quotation Management | To cover bids for corporate contracts – no specific systems in place for this function | No Systems Provided |
| Sales Management | IRIS is the Point of Sale web-based application that allows the Sales Force to process orders. | IRIS ² Credits Commercial Portal Nova Loyalty Rewards System Canal Online Shop |

15.3 Key Interactions

| System | Interaction | Via | Notes |
|--------|---|-------------|--|
| CID | Clarify 10.1 | FTP | It sends the Commissionable events; It receives the SFIDs |
| CID | Arbor | FTP | It sends the files of each cycle of invoicing |
| CID | IRIS | FTP | It sends the activation of VASs and receives the SFIDs |
| CID | NOVA | FTP | It send the allocation of Distributor's portfolio and receives the SFIDs |
| CID | PRECOS | FTP | It sends the commissions relative to prepayments and receives the SFIDs |
| CID | Incentix | FTP, Tuxedo | It sends the electronic reports in order to Incentix manages the incidents of the commercial people payments and Incentix sends/receives to/from CID the commercial hierarchy. |
| CID | Loyalties Rewards System | FTP | It sends information related to loyalties |
| CID | Fraud System (HPFMS) | FTP; Tuxedo | It sends penalties by fraud and receives the SFIDs |
| CID | Distribution Sales Force Fraud System (HPFMS) | FTP | It sends commissionable events and distribution hierarchies. |
| CID | IMP | FTP | It receives the commissions by customer's consumption |
| CID | Control IMEI | FTP | It sends the changes of terminals by guarantees and receives the hierarchy of Distributors |
| CID | Doc1 | FTP | It receives commissions information to generate the corresponding report |
| CID | Commercial Portal | FTP; Tuxedo | It sends the adjustments by incidents and inscriptions in the loyalties. |
| CID | DWH (Aida) | FTP | It receives SFIDs and commissions payment |
| CID | Quality | FTP | It sends payments to be paid |
| CID | Credits | FTP | It sends the payments of credits |
| CID | SAP | FTP | It sends and receives information related to Distributors and receives also the payment of the commissions |
| CID | WAMA | Tuxedo | It sends the SFIDs and receives the handsets to repair of the post-sale service. |

² IRIS would be covered by Sales Management and Order Capture and Validation subdomains

| System | Interaction | Via | Notes |
|-------------------|---|-------------------------|---|
| CID | Segmentation Master | Tuxedo | It receives the information about the customer segment from Segmentation. |
| CID | Tibco IM | Tibco (rv) | Provisioned events through Tiibco Bus. |
| CID | Tuxedo Domains | Tuxedo | Queries of several applications: Infoguía, etc. |
| PRECOS | Clarify 11.5 | FTP | It sends activations of SIM cards non-preassigned with the telephone numbers |
| PRECOS | CUR | FTP | It sends activations and decontaminations of the telephone numbers of prepayment |
| PRECOS | SIRA | FTP | It sends the top-ups |
| PRECOS | CID | FTP | It sends info of networks distribution structure, of SFIDs, self-invoicing codes used for the payment of commissions. It receives the payments to be made to Distributors cause of the prepayment events. |
| PRECOS | SMS Platform (SMSC) | Tuxedo | It sends SMS to the prepaid customer to authenticate his/her data |
| PRECOS | Control IMEI | FTP | It sends the movements of packs, the load of models of terminals and the update of packs. |
| PRECOS | SAP | FTP | It sends codes of indebted creditors and distributors. |
| PRECOS | Commercial Portal | FTP | The access of the user is received by PRECOS after the distributor has been authenticated in the Commercial Portal (Distributor's web portal) |
| PRECOS | Operator Logistics | FTP | It sends the movements of SIM from logistic operators to the suppliers and the returns of these. |
| PRECOS | SERPA | FTP | It sends the info about card SIMs preassigned with the telephone numbers |
| PRECOS | Loyalties Rewards System | Tuxedo | It sends the request to give 100 bonus-points for the points programme. |
| PRECOS | DWH (Aida) | FTP | It sends all data of the PRECOS system |
| PRECOS | Distribution Sales Force Fraud System (HPFMS) | FTP | It sends the info about activations, hierarchies, etc. |
| Commercial Portal | CID | Tuxedo | |
| Commercial Portal | Loyalty rewards system | Tuxedo | |
| Commercial Portal | DOC1 | Tuxedo | |
| Commercial Portal | Imagen | Tuxedo | |
| Commercial Portal | NCRM (Clarify 11.5) | Tuxedo & point to point | |
| Commercial Portal | SAP/R3 | Tuxedo-TIBCO | |
| Welcome Pack3 | Clarify 10.1 | Tuxedo / ftp | Outgoing from Welcome Pack |

³ Welcome Pack main features are picking up pre-paid personal data through several channels (non obligatory in pre-paid activation in Spain) and rewarding the customer with loyalty points or bonus top-ups when he/she gives us that data. The functionality related to update pre-paid customer's data is available in Clarify 11.5 (Apolo) and previously in Clarify 10.1. Rewards are not implemented

| System | Interaction | Via | Notes |
|--------------|-----------------------------|--------------------|---|
| Welcome Pack | NCRM (Clarify 11.5) | Tuxedo / ftp | Outgoing from Welcome Pack |
| Welcome Pack | SAP | FTP | Outgoing from Welcome Pack |
| Welcome Pack | Loyalty Rewards System | Tuxedo | Outgoing from Welcome Pack |
| Welcome Pack | DWH | FTP | Outgoing from Welcome Pack |
| Welcome Pack | My Vodafone (Web) | | Connection into Welcome Pack |
| IRIS | Imaging | Tuxedo | |
| IRIS | Clarify 10.1 | Tuxedo | |
| IRIS | Activa (Clarify 10.1) | Tuxedo | |
| IRIS | CID | Tuxedo | |
| IRIS | SAP | Tuxedo | |
| IRIS | SGC | Tuxedo | |
| NPPI | Clarify 10.1 | Tuxedo /Tibco (rv) | A→B |
| NPPI | Clarify 10.1 | FTP File | A <--> B |
| NPPI | Loyalty Rewards System | FTP | |
| NOVA | Clarify 10.1 | | Receives the update of services data. |
| NOVA | Credits | FTP (Batch job) | Receives vouchers of points to the dealers; they use these vouchers to avoid churning (the points of the vouchers can be changed for terminals in the Loyalty Rewards System (loyalty system, see corresponding chapter) |
| NOVA | NCRM (Clarify 11.5) | FTP (Batch job) | The loyalty policies are applied and then some actions will be accomplished. These actions are sent to the NCRM to generate new cases (new service activation, loyalty cancellation for a new terminal, discounts in a bill....). |
| NOVA | Distribution (CID) | FTP (Batch job) | Receives information about the VF Distribution network |
| NOVA | DWH (Aida) | FTP (Batch job) | Receives customer data |
| NOVA | Portability | FTP (Batch job) | Sends information about the requests of change to other Companies. So that, the alarms alert the agent to start a loyalty action to avoid churning. |
| NOVA | EDWH | FTP (Batch job) | Receives information for the data analysis and the decision making |
| NOVA | Campaigns Management System | FTP (Batch job) | Batch process to receive commercial campaigns. |
| NOVA | Schober | FTP (Batch job) | Batch process to obtain possible customers from an external Company which dedicated to analyse Companies. |
| NOVA | SAP | FTP (Batch job) | |
| NOVA | Modiclins | FTP (Batch job) | |
| NOVA | Segmentation | FTP (Batch job) | |

in Clarify. Rather than attempt to customise Clarify, which would impact on future support or migration plans, it is preferable to build a small separate application to handle loyalty information.

| System | Interaction | Via | Notes |
|------------------------|------------------------|-----------------------|---|
| NOVA | Portal Comercial | TUXEDO | |
| NOVA | CID | TUXEDO | Sends the customers assigned to each seller for the commissions payment. |
| NOVA | Credits | TUXEDO | Sends vouchers of points to the dealers; they use these vouchers to avoid churning (the points of the vouchers can be changed for terminals in the Loyalty Rewards System (loyalty system, see corresponding chapter) |
| NOVA | NCRM (Clarify 11.5) | TUXEDO | Receives information of the churning threads and generates alarms for launching loyalty/avoid churning actions. Creates and consults commercial contacts. |
| NOVA | Loyalty Rewards System | TUXEDO | Receives orders in the Loyalty Rewards System (loyalty system: see corresponding chapter). |
| NOVA | Clarify 10.1 | TUXEDO | Customers data inquiries, accounts inquiry, services inquiry (telephone number, service class activation date, SFID, status, promotion code and expiration date of the promotion) |
| NOVA | Segmentation | TUXEDO | Customers segmentation (category, service level, high selling, recommended action, monthly average bill, average number of lines, collection status, etc...) |
| NOVA | Incentives (CID) | TUXEDO | Incentives inquiry |
| NOVA | NBA | TUXEDO | Pending NBA (Next Best Activities) inquiry |
| NOVA | IRIS | TUXEDO | The seller access IRIS to activate services for the customer |
| NOVA | SAP | TUXEDO | |
| NOVA | Clarify 10.1 | TUXEDO | |
| NOVA | NDS | TUXEDO | |
| NOVA | NCRM (Clarify 11.5) | TUXEDO | |
| Loyalty Rewards System | Welcome Pack | Point to point (JDBC) | |
| Loyalty Rewards System | Clarify 10.1 | Tuxedo | |
| Loyalty Rewards System | NCRM (Clarify 11.5) | Tuxedo | |
| Loyalty Rewards System | SAP-SCM | Tuxedo | |
| Loyalty Rewards System | DOC1 | FTP | |
| Loyalty Rewards System | ALMA | Tuxedo (ftp) | This interface replaces the previous IXOS / Imaging one |
| Loyalty Rewards System | My Vodafone | Web Services link | |

| System | Interaction | Via | Notes |
|----------------------------|----------------------------|----------------|---|
| Loyalty Rewards System | Loyalty Points Calculation | Tibco /Tuxedo | |
| Loyalty Rewards System | Campaign Management System | FTP | Send data to Royalty specific datawarehouse called TRIO |
| Loyalty Rewards System | DWH | FTP | |
| Loyalty Rewards System | QueryWeb | Tuxedo (FTP) | |
| Loyalty Rewards System | IVR-Ydilo | Tuxedo | |
| Loyalty Rewards System | SIRA | Tuxedo | |
| Loyalty Rewards System | VF - Publishing | | Interface to vodafone.es |
| Loyalty Rewards System | CID | FTP | |
| Loyalty Rewards System | Credits | Tibco / Tuxedo | |
| Loyalty Rewards System | Commercial Portal | Tibco / Tuxedo | |
| Loyalty Rewards System | NOVA | Tibco / Tuxedo | |
| Loyalty Rewards System | NPPI | Tibco | |
| Loyalty Rewards System | WAMA | link | |
| Loyalty Rewards System | Segmentation Master | Tuxedo FTP | |
| Loyalty Rewards System | Ixos | Tuxedo FTP | |
| Loyalty Points Calculation | Clarify 10.1 | Tuxedo | |
| Loyalty Points Calculation | IVR-Ydilo | Tuxedo | |
| Loyalty Points Calculation | NOVA | Tuxedo | |
| Loyalty Points Calculation | Welcome Pack | Tuxedo | |
| Loyalty Points Calculation | My Vodafone | Web services | |
| Loyalty Points Calculation | CUR | Tibco | |

| System | Interaction | Via | Notes |
|----------------------------|----------------------------|----------------|--------------------------------|
| Loyalty Points Calculation | NPPI | Tibco / FTP | This interface is under review |
| Loyalty Points Calculation | SIRA | FTP | |
| Loyalty Points Calculation | Campaign Management System | FTP | |
| Loyalty Points Calculation | ARBOR | FTP | |
| Loyalty Points Calculation | Commercial Portal | Tuxedo | |
| Loyalty Points Calculation | Segmentation Master | FTP | |
| Loyalty Points Calculation | Loyalty Rewards System | Tibco / Tuxedo | |
| Loyalty Points Calculation | USSD | Tuxedo | |
| Loyalty Points Calculation | SMSC | Web service | |
| Loyalty Points Calculation | MMSC | Web Service | |
| Loyalty Points Calculation | NCRM (C11.5) | Tibco / Tuxedo | |

Note: Canal Online Shop doesn't have any interface with another system in VF-Spain in the current live version. The only interaction with VF-Spain systems is that the web servers are located in VF-Spain infrastructure while the application server is on the FullSix facilities.

15.4 Planned Changes and Known Architectural Issues



Changes that will be occurring in the near future are to IRIS which will need to have an interface into Clarify 11.5 added in order to extend its functionality. No new systems – rather a new adaptor to increase the ability of sales force to make Orders at POS.

Key point about IRIS is that it is a web-based application running on a WebLogic Application Server..

Loyalty Programme and NOVA systems will be substituted by a new platform aligned with the Solution Catalogue Entry for Sales Force Automation solution area (SFA – Siebel). This migration project has already started up.

16 Appendix – System Mapping

Below is an extract from the new Global IT EA tool. The table, included in the excel file attached, is sorted by system with the information about GITA Domain with Level 1 domains followed by their respective Level 2 Sub-Domains mapped. In addition, it is also included the supplier and package information of each system.

| Document | Description |
|--|--|
|  C:\VF Spain Application Portfolio t G:\AT_Global_IT_SP&A\Publico\GITA5.2_AS_IS_Arquitectura\VF Spain Application Portfolio baseline v1.xls | VF Spain Application Portfolio BaseLine (Nov 2006) |
|  C:\VF Spain Interfaces.xls G:\AT_Global_IT_SP&A\Publico\GITA5.2_AS_IS_Arquitectura\VF Spain Interfaces v1.xls | VF Spain Interfaces (Nov 2006) Source: Enterprise Architecture Tool (ARIS) All VF Spain systems inventory, their interfaces and diagrams of interaction among the systems is also provided by ARIS. |