OSS BSS Technologies

Professional Services

Integrated OSS / BSS Systems

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Author: Ekhard Konrath
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Commercial In Confidence

1. Executive Summery

1.1 Integrated OSS/BSS Systems

1.1.1 Objectives

OSS/BSS Management systems have become a roadblock to innovation instead of a business tool for competitive success. The pace of change is such that incremental improvements won't work. Operators and Service providers must increase their operational efficiency by an order of magnitude while software developers and systems integrators need to find completely new ways of quickly producing profitable solutions.

Equally, Operators or Service providers must respond to a fundamental change in how their customers want to do business. Web-enabled, self-service solutions, and real-time access to information about a customer's service are two examples. Both are difficult to achieve using current standalone systems, each with discrete data bases.

Service providers must also improve their ability to automate across the value chain – in other words, their ability to work with multiple players to provide an end-to-end service. The changing business environment calls for a re-thinking on the part of communications and information service providers on how they manage their business.

It also calls for software developers to embrace a new way to developing management software. The TMF, dedicated to enabling resolution of the problems of integrating business and operational support systems, has embraced the challenge of defining a common systems environment that will meet rapidly evolving business needs.

New Generation Operational Systems and Software (NGOSS), is aimed at achieving market-available off-the-shelf systems that can plug and play far more easily than today. The NGOSS program begins with a firm set of requirements that will drive subsequent activities including an integration architecture.

What does the NGOSS look like ? NGOSS is based on commercial off-the-shelf technologies instead of technologies unique to telecom as most legacy systems are. This significantly improves software reuse and operational flexibility enabling it to support a range of new services and new technology environments. In addition, they are designed to
easily integrate with other systems eliminating the stovepipe solutions or the need to deploy an overlay network for management.

Among the principles of the NGOSS is the separation of process flow control from functional application, giving service providers the ability to tailor and differentiate their business processes while still using off-the-shelf software. Equally important are the concepts of common data, common directories and a common communications 'bus' that makes plug and play a practical reality.

Service providers realize a number of significant benefits from NGOSS including lower procurement and deployment costs. Because it's not a stovepipe solution, new services can be brought to market in a much shorter timeframe. Second, with network technology rapidly becoming a commodity, management systems are playing a key role in helping providers gain a competitive advantage.

The advantage is in how the systems are built and how you use them. With the separation of process control from function, the ability to use common systems in different ways becomes much easier, and differentiation is enhanced.

Finally, most service providers are forced to devote an inordinate amount of resources on fixing 'plumbing' issues as they try to integrate systems. Their internal developers are focused on solving high-cost, low-value problems.

By gaining industry-wide agreement on how OSS/BSS Systems are built and function, these internal resources can be re-assigned to value-added areas that make a competitive difference such as improving customer service.

A simple view to the integrated OSS/BSS Systems for management of Mobile and IP Networks are:

- One OSS/BSS controlling Infrastructure to manage all kind of networks (Fix, Mobile, IP) and the applications all out of one System
- Five different Areas for management the total environment of a Operator or Service Provider as:

  - Customer Management
    = POS, CRM, Call Centre, self Provisioning, Order Management
  - Service Management
    = Service Assurance and Service Provisioning
    = Policy and QoS Management
    = Fraud and SLM and Meta Directories
    = Service Delivery Platforms
  - Network Management
    = Network Planning, NMS with FCAPS functions,
    = Infrastructure Configuration Provisioning, Inventory Management
    = O&M Operation and Maintenance Management
    = Interfacing the EMS Element Management Systems from all HW Network Supplier
    = Inventory Management
    = Trouble Ticketing
  - Commercial Management
    = Billing and Payment Systems, DWH- EIS Systems, Archive Systems
    = ERP, Accounting, AAA
  - System Management
    = Backup and Recovery Systems
    = Disaster Recovery Systems
    = Security Management

- Analysis of real costs and best of breed OSS/BSS Systems
- Reduce OPEX and CAPEX costs according a integrated environment and automation of Business Processes
- One integrated EAI Middleware System e.g based on OSSJ, based with plug and play principles
- Pre integrated best in class open API`s with standard Interfaces to all kind of Networks and Suppliers
- Monitoring the communication on the Interface between the OSS/BSS Systems and the Networks
- Integration planning
- Testing the Business Processes (Applications)
- Integration testing

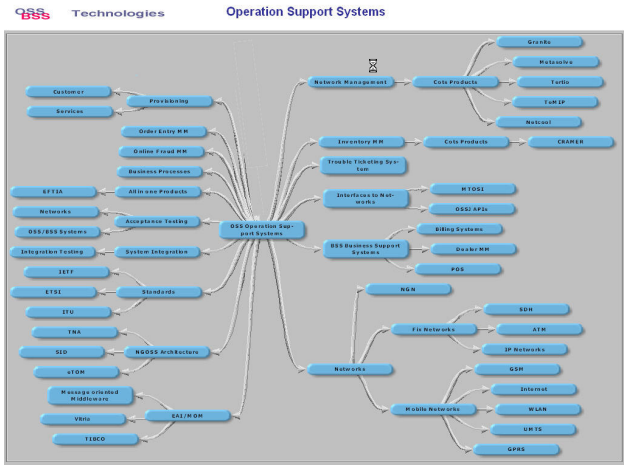

Figure 1

1.1.2 Mission

The Mission is to find Projects by a Telco or Service Providers to build based on OSSJ and NGOSS principles OSS/BSS – who can be more flexible in reacting to extensions in Network environments or on Services.

The quality of this kind of OSS/BSS Systems is that we has experience in a very complex part of this OSS/BSS Business the excellent open API`s for interfacing the Business Processes in a preconfigured way with plug and play possibilities.

The market agreement around a common approach is to plug and play with software components together, the developers can 'prepare components once – and sell it many. By adhering to some common principles, it will be easier for software suppliers to sell their products as part of a more complete solution.

Regardless of whether integration is performed by the service provider or by a systems integrator, the software will look more attractive if integration time is minimized.

1.1.3 Keys to Success

The keys to success are:

- Acquisition of the project from the Telco Industry
- OPEX reduction
- Faster and professional integration of OSS/BSS Systems and Networks
- Selecting Partners with experience in this field for implementing the framework and the acceptance
- Manage the Project under responsibility of OSS-BSS Technologies and growth deep knowledge in this field

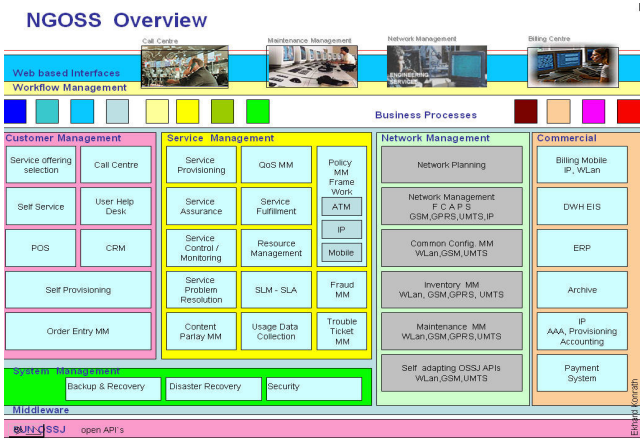

Figure 2

2. Integrated OSS/BSS Systems

2.1 Introduction

For effective operation, administration and maintenance of a Mobile, Fix and IP networks, the network operator needs a Telecommunications Management Network (TMN) including a flexible Operations Support System (OSS) & Business Support System (BSS) and an organizational structure capable of operating OSS/ BSS Infrastructures.

To explains the functionality of the OSS/ BSS solutions to understand the effort Operators want to invest to manage in the future all kind of networks based on IP communication structures, and the operating personnel requirements of the OSS/ BSS Systems.

The OSS/ BSS delivers the following functionality:

- Services Management using a Billing and Payment Systems for all networks in separate or combined Systems
- New Services using Customer relationship Systems to interact with the Customer when contacts are available, new Applications like Content provisioning, Internet access, mobile Office and Customers Information management out of one infrastructure
- Provisioning System
- New Services using Voice recording on demand or fix installed new Service for Prepaid and regular Mobile users.
- Call Centre with Subscriber management, Customer Care and Helpdesk functions
- Services Management to ensure at POS and Dealers , that the Customers can subscribe online to get information about his Bill and or extend and subscribe new Services or move payment to his mobile account or pay directly
- Umbrella Network Management using a Network Management Centre (NMC)
- Network Element Management using Operation and Maintenance Centres

(OMC's) for Switching , Radio part, Transmission and Intelligent Networking
- Mediation Devices for fix, mobile, or IP networks for Subscriber and Service Administration and Call data collection
- Data Warehouse for Network management, Marketing and Sales
- Archive System to hold over 20 years usage data from the Customers
- New Services System as (VMS, SMS, EMS, MMS, Video on demand, WAP Services, Sim, Prepaid, Policy with configuration and QoS and Directory Services)

The design goals for OSS/BSS Systems are:

• Application of Distributed Systems
  - Move away from 'stove pipe' (stand alone) OSSs to more of a 'common infrastructure' for management process interaction
• Focusing of Corporate Data
  - Physically and logically centralised data, providing more integrated views of customer and operational data
• Application Components / Re-use
  - Functional re-use of business process components
  - Code re-use of software components
• Increased use of Object Oriented Design
  - For components of OSS functionality as well as modelling managed devices.
  - Improved development time, costs etc.
• Technology-Neutral System Framework with Technology Specific Implementations
• Multi-Vendor Supply and Integration
• General Purpose (cost effective) Systems Access
  - Operational Staff low cost access to data / processes.
  - Customer system interoperability to SP data / processes
• Separation of control of Business Process flow from Business Component operation
  - Provides flexibility to rapidly produce new business solutions
  - Allows more re-use of Business Components across multiple business scenarios
• Workflow Automation
  - Ability to automate present manual tasks
  - Flexibility to change business process sequence
• Legacy / Heritage Systems
  - Ability to integrate existing systems in OSS/BSS infrastructure
  - Application of 'adaptation' and 'wrapping' techniques

This solution matches the recommended objectives for TMN specifications.

To achieve these goals the O&M Architecture is designed as shown in Figure 3.

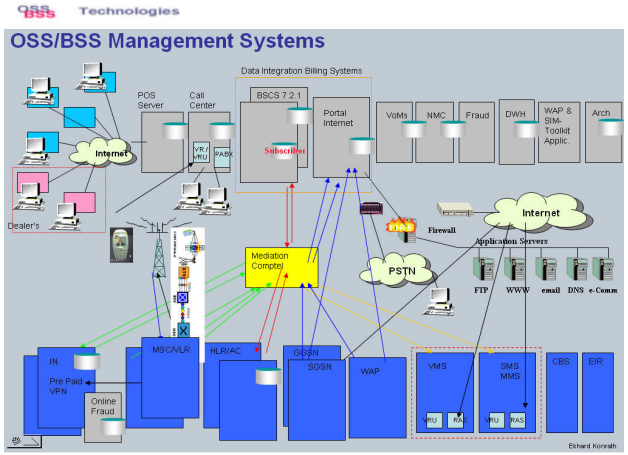

Figure 3

The OSS and O&M organization and functions must be designed to provide and maintain a good quality of service to the mobile users and to be flexible enough to keep pace with the network expansion.

The two aspects of customer care with customer services sections and network operations with umbrella and decentralized Network Management was taken into account to bring with a minimum on personal a complex infrastructure like this OSS/BSS on life.

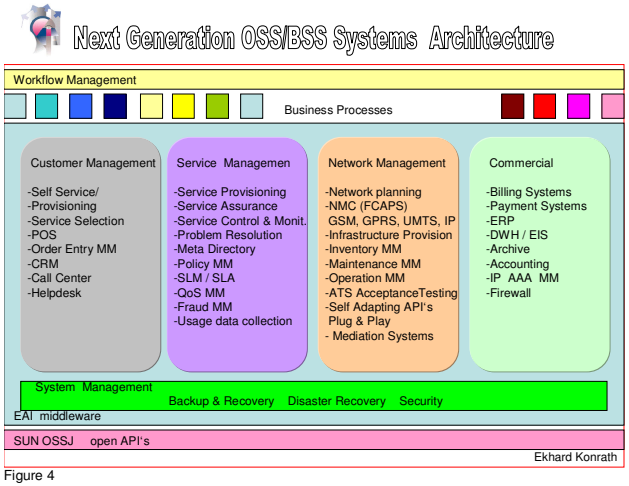

Figure 4

2.1.1 OSS/ BSS and inter working to the Networks

Despite the initial lack of standards for OSS/BSS, standardisation is emerging due to the high amount of flexibility demanded of OSS/BSS commercial and network functionality. This is resulting in the implementation of a standard OSS/BSS such as described in this paper.

The implementation of a standard OS/BSS architecture is proving of benefit to network operators, by providing the ability to service larger subscriber bases, manage network elements from different vendors, and interworking with other network operators.

The most important benefits of the OSS/BSS, however, lie in those features which are important from the subscribers' point of view.

2.1.1.1 Support of multiple sales channels

The potential subscriber base is automatically widened by the utilisation of every channel to the market. Therefore a nation-wide dealer network and the introduction of service providers or resellers increases the operator's ability to reach new customers at competitive prices in recognised and as yet untapped market sectors.

The challenges here for the network operator are for an efficient sales and distribution organisation together with these partners, and optimum customer data and revenue information sharing via the Billing and Accounting System.

2.1.1.2 Fast and efficient customer registration

A potential customer must be given the advantages of practical pre-sales information, and the ability to buy a subscription on demand. In the case of GSM the SIM card plays a key role in the registration process, therefore an efficient system for SIM distribution and personalisation is required to make one-stop-shopping and immediate service usability possible.

2.1.1.3 Security management

The OSS initiates and manages the implementation of routing information and encryption keys in the network and the customer SIM card. Therefore the secure management of this data (particularly by the PCS and SMC) plays a key role in providing the benefits of connection security and privacy to subscribers.

2.1.1.4 Quality of Service of Mobile Networks

The OSS supports and monitors

- The capability of a subscriber to subscribe to desired services
- High connection establishment and retention - support and monitoring
- High connection quality
- High network availability

ensuring a high Quality of Service of the GSM network, and therefore a reliable service from the subscriber's point of view.

2.1.1.5 Accurate, informative billing

Detailed statements have become standard billing practice, making bill accuracy a highly visible and essential feature of the operator's quality of service. In addition the introduction of advice of charge supplementary services in GSM switches has made the co-ordination of charging parameters in the switches and the BAS a key function of the network management.

2.1.1.6 Flexible tariffing

In complex networks such as GSM, with features such as multiple phone numbers and services per subscription, competitive tariff packaging and inter-network roaming, subscriber billing demands a flexible tariff model. This flexibility requirement has made data driven tariffing a standard part of the BAS, for ease of restructuring and tariff customisation. Equally important is the ability to retrieve marketing data on the effect of any tariff structure to feed back and optimise the operator's tariff plans.

2.1.1.7 Caring post-sales customer care

In a competitive market customer care becomes the primary objective of the BAS. Customer data must be accessible to all customer-facing staff, from pre-sales organisations to post-sales, billing and directory enquiry services and customer care teams, for immediate response to customer needs.
With the implementation of an OSS with these features and benefits, the network operator is well on the way to achieving the objectives of

- Maximum growth in the number of subscribers,
- Retention of a loyal, satisfied customer base.

2.1.2 Interworking in the OSS/BSS

The Subscriber Administration is an interworking between several Server Systems in the OSS/BSS, this are

- POS
- Dealer shops
- Service Provider
- Resellers
- Call Centre
- Mobile Networks
- Provisioning
- Portals
- Internet

with the Billing System and over the Mediation Device down the Mobile Network. The Network Management is also interworking between Network Planning Server and the NMC the VIOMC's and the OMC's

Fraud Management is interworking with the Mediation Device and the Billing System.

The Call Center is interworking with the Billing System, the GIS System and the NMC.

Depending if the Billing System is preparing the Bill information on a file for later Printing in a outsourced invironment, or if the Bill will be prepared in Cell C the preparation Process (bill design) is the same only the Printing and Enveloping is different organized.

Data Warehouse is interworking to all importand legacy systems from the OSS and in the company, as

- Call Centre
- Fraud MM System

- Billing System
- Mediation Device
- NMC
- ERP System
- VAS Servers
- SMS
- EMS
- MMS
- etc.

The Archive System is interworking with the DWH, Billing System and NMC.

2.1.3 OSS/BSS System Integration

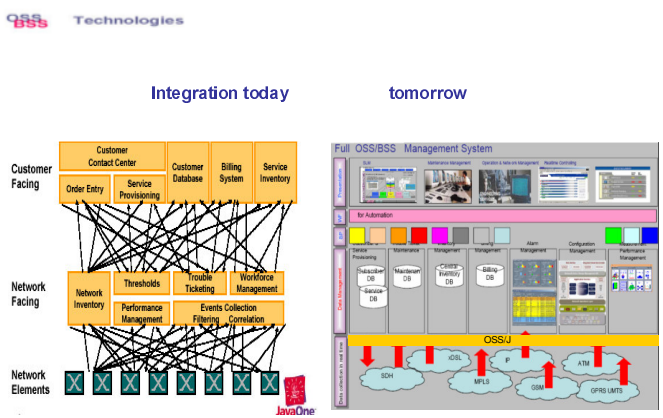

Figure 4

2.1.3.1 System Integration, Delivery and Installation

All planning and management activities needed to ensure a successful conclusion to the contract, shall be on the responsibility of both partners, Operators Management and the Supplier. This will cover at least the following

- manage and coordinate the planing, specification and test work
- issue monthly project meetings and progress reports
- issue monthly steering committee meetings
- organize review meetings
- write and issue minutes of all meetings

For the system integration, delivery and installation of the OSS system the project management will prepare during the test specification period the following points

- planing the system integration and installation
- preparing the system integration plan
- preparing the installation plan
- preparing the installation schedule

Integration Points

Overview of integration points of the OSS/BSS Architecture. It shows related systems, functionality of relation, what party integrates to the other Integrating Party has to be confirmed. It is only an example and will be prepared for each interface and system.

Example

Integrating Party	Integrated Party	Functionality
OM/ERM	Billing	Customer Administration Reference Data (eg product data)
POS	Billing	Customer Administration Reference Data Payment
Billing	ERP	G/L module via A/R Cash and Banks module via A/R Journal
Mediation	Billing	CDR Collection Service Activation
Billing	Print Shop	Print files Enveloppin control information
Billing	DES	Customer Data
Billing	external interfaces	Bank Credit Card Clearing house Interconnect Sim Card supplier
Call Center (IVR)	Billing	Access account information

2.1.3.2 OSS/BSS System Integration

The OSS/BSS Integration will be done in functional building Blocks as

Integration of POS, Dealer, SP

Integration of POS, Dealer, SP and other Infrastructures over Internal LAN in the case of Cell C own Organisation and over Internet for all other Areas. All Infrastructures will be integrated to The POS Server.

Integration POS Server Billing System

The integration of POS Server to the Billing System

OSS/BSS Mobile Network Integration

- Integration Mediation Device to the GSM Network

For Subscriber Administration the Billing System over the MD will be integrated to the MSC's , HLR and the IN System. Is the Subscriber in the HLR installed the message will be given back over the Billing System to the POS, Dealer or other Front Office Systems.

OSS/BSS Internet Integration

The Internet Infrastructure will be integrated to the Billing System

- OSS/BSS - Data Network Integration

The data Network is the main infrastructure in the OSS who connects all OSS Server Systems under each other and all Office Systems as PC's and Printers etc. and establish the connection to the GSM, GPRS, UMTS Network.

We implement three different Sub Networks a Office LAN, a OSS LAN and a interconnection Part.

2.1.4 OSS/BSS System Operation

2.1.4.1 System Operation Management

The Managed Services team will run continuously the operations department with respect to the complete IT total solution for a defined period of n months post launch, followed by a seamless functional hand-over to the Customer's IT staff.

Delivery of Managed Services

- Objectives for Operation

- Continuous
- Reliable
- High availability
- 24 hrs support
- Establishing plans, processes, structures and people
- Knowledge Transfer
- Seamless hand-over to Operator

- Processes

In order to describe how the Total Solution will be managed, one needs to list the processes (Delivery Processes) that will be employed.

- Incident Management
- Operation & Maintenance Management
- Configuration Management
- Capacity Management
- Problem Management
- S/W Control and Distribution
- Change Management
- MS Implementation Consulting
- Technical competence center
- Billing Management
- Network Management
- New Service implementation (Parlay, SDP)
- Service level management

These processes will supply management for all the infrastructure elements and applications contained within the Total Solution.

- Delivering the Services

The two main points on which establishment of the processes and the delivery of Customers managed Services are:

- An Organization
- The supporting technical infrastructure

2.1.5 OSS through Java (OSSJ)

The OSS through Java Initiative from Sun in the context of the growing next-generation OSS/BSS Systems as the Fix, Mobile, IP markets. The OSS through Java specifications provide a new set of technologies to the users, builders, and beneficiaries of the service provider, OSS/BSS and Billing and CRM systems.

As a result of the OSS through Java efforts, OSS and billing architectures are evolving, competitive dynamics in OSS and billing are shifting, and usage of Java technologies in the industry community is showing that this initiative can have a deep and far-reaching effect on the industry.

This initiative can help vendors, integrators, and users to begin to evaluate OSS through Java APIs for adoption to integrate different OSS/BSS Systems over standardized Interface the communication with the different networks.

OSS BSS Technologies

OSS/BSS interoperability today

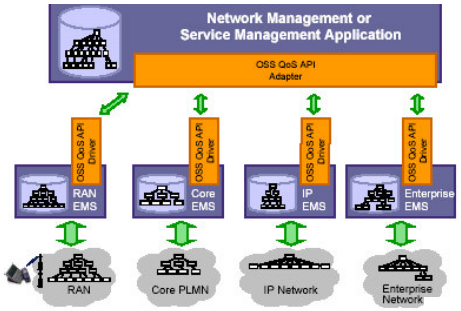

Figure 5

2.1.5.1 Situation Overview

To date, the history of OSS and billing has been shaped by the uniqueness of telecommunications infrastructures and processes as much as by the history of software development. It has been an unquestioned point of pride that telecommunications software requirements are vastly different than those of general enterprises such as manufacturing and healthcare.

However, as IP-based network technologies take hold among service providers, commonalities are beginning to appear in the infrastructure. Business processes of the telecommunications company are increasingly in step with the business processes of other firms with logistical or joint venture projects. Significantly, the tools in use by telecommunications experts have become more mainstream over the past five years.

For example, some core member of OSS through Java are moving forward in step with the new generation of OSS and billing offerings, once was dominant in expensive, customized OSS software implementations.

Demand for such individualized infrastructure investments has trailed off in the face of commercial product offerings with lower cost levels as much as industry re-structuring. Key examples of problematic efforts from older generations include the CMIP experiment.

As software tools, IP infrastructure, and telecom business processes were changing in the late 1990s, another important change was taking place: commercialized OSS and billing. Seemingly endless Greenfield CLEC opportunities and the network technology explosion drove the arrival of commercialized, packaged OSS and billing systems.

The creation and support of new network services required a rapid infusion of intellectual capital. But with staffing shortages internal to service providers and at a number of integrators, commercial software offerings became a key way of jump-starting OSS and billing systems.

Along the way, telecoms began to learn that they might not be so different from other enterprises after all. When service providers began to link the new products together, application integration challenges confirmed that observation.

Based on broad user support for Java technologies and tangible examples such as the OSS through Java APIs, the Java and J2EE technologies look poised to become examples of a successful undertaking in telecommunications infrastructure. It is also possible that OSS through Java can overhaul the cost structures of OSS — and by association the service provider's service creation and management costs.

2.1.5.2 The OSS Through Java Initiative

The OSS through Java Initiative started in May 2000 as an effort to capitalize on the promise of 3G infrastructures. A key motivation was the opportunity to shape the structure of the new generation OSS and billing being developed for the 3G infrastructures. This included building OSS support into infrastructure equipment as well as other infrastructure investments. The first phase targeted trouble ticketing, 3G wireless service activation, and QoS as the initial set of APIs to develop.

At the close of 2000, almost 15 vendors were involved in building the technical specifications. By mid-2001, the initial drafts moved to open public review. In spring 2002, three phase 1 APIs were finalized and work on an additional set was underway. Among the phase 2 APIs are IP billing and inventory.

The Java Specification Requests (JSRs) are the numbered references for the many APIs within the Java Community Process (JCP). A certification process for people using the APIs is already in place and active for those specifications in final release.

Both the specifications and the list of certified products are on the group's Web site. The following Table includes all of the OSS through Java APIs through March 31, 2002.

OSS Through Java APIs, March 31, 2002

JSR #	Title	Status Specification
00089	OSS Service Activation API	Final release
000900	OSS Quality of Service API	Proposed final
00091	OSS Trouble Ticket API	Final release
000130	OSS IP Billing API	JSR approved
000142	OSS Inventory API	JSR approved
000144	OSS Common API	Final release

The players in the process include official members, expert participants, and interested parties. Throughout the work, the OSS through Java team is leveraging and in some cases, synthesizing the work of standards bodies such as:

- 3rd Generation Partnership Project (3GPP)
- Object Management Group (OMG)
- Workflow Management Coalition
- International Telecommunications Union (ITU)
- The Parlay Group (Parlay)
- IP Detail Record Organization (IPDR.org)
- Telemanagement Forum (TMF)

2.1.5.3 The Organization

The core members are BEA, Ericsson, MetaSolv, Motorola, NEC, Nokia, Nortel Networks, Sun, and Telcordia Technologies. Key partner level members — a tier 2 designation — include Borland, Component Insights, eXcelon, and PwC Consulting.

The third tier of members making staff, financial, and expertise investments in OSS through Java are the Focus members, which include Agilent Technologies, Cygent, Digital Fairway, Eftia, PrismTech, and TeleGea.

Examples of industry experts that participate in a typically less assetintensive way include ADC Metrica, Amdocs, Cisco, Evidian, HP, Lucent, NTT, Portal, Siemens, Watchmark, and Xacct. Examples of early adopters that are implementing the APIs include Accenture, Alcatel, British Telecom, Clarity, Comptel, Eftia, Ilog, Ipsoft, Sepro, and Tertio etc.

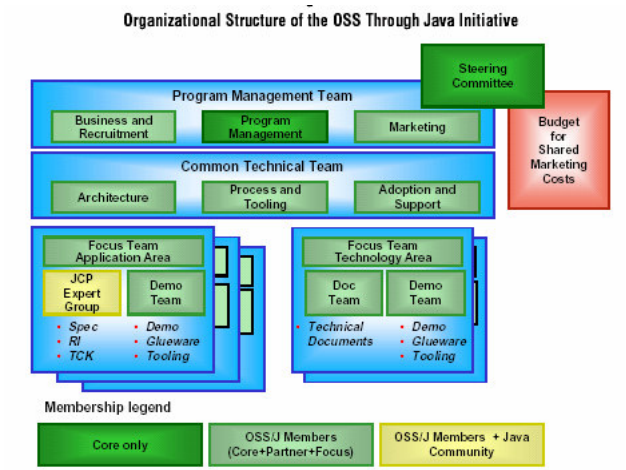

Figure 6

2.1.5.4 Technology Drivers

As of March 2002, acceptance by 16 active member companies, 26 additional JCP expert companies, 50 early pre release adopters, and 50 companies that have announced implementations has occurred.

Statistics from the group's Web site show that the current versions of the APIs have seen over 6,600 downloads and that the early adopters were responsible for 530 downloads during a two-week period at the end of February 2002.

Additionally, projects within the TMF Catalyst demonstrations and Eurescom are maturing.
Three specific factors further contribute to the momentum of OSS through Java Initiative: leadership, familiarity, and cost-savings potential.

Today, OSS through Java is a JCP public domain effort with strong backing. Such openness is a key strength of OSS through Java. The membership and participants of the initiative are industry influencers that contribute to the group's authority.

Under the OSS Common API specification, the OSS through Java team described Enterprise Java Beans (EJB) and Java Message Service (JMS) as the most important J2EE APIs for the OSS efforts.

Many vendors in the service provider infrastructure are already involved with EJB technologies. The wireless infrastructure management and provisioning efforts are also poised to benefit from the use of Java in handsets.

The key analogy to Java technologies as an API tool is the arrival of the browser interface. Browsers as a common GUI substantially altered the basis of competition in many of the segments of the OSS and Billing markets in the late 1990s, because product development cycles did not need to include "ports" to HP-UX or Windows NT.

Standardized APIs and software techniques can be massively influential in OSS, billing, and related infrastructure management markets because they reduce the barriers to success and eliminate the need for expansive (and expensive) knowledge of software development details.

2.1.5.5 Technology Life Cycle

The life cycle of the OSS, billing, and network equipment infrastructures in telecommunications is largely driven by new service offerings from the carrier to its customers who may be consumers, businesses, or other service providers.

Additionally, new network technologies or business processes can reset the clock on maturing infrastructure. In 2002–2005, all three factors are acting on the service provider infrastructure. The most notable forces inspiring new investments are enhanced services, 3G wireless, and reduced (equipment) spending.

Increasing complexity of enhanced service offerings such as tiered service levels and dynamic personalization require vastly improved automation inside of the OSS and billing processes. Similarly, overinvestments in network equipment are prompting service providers to improve automation and use of discovery and inventory processes.

The early stage of much of the GPRS/3G OSS, NM and Billing systems fuels the momentum of OSS through Java by putting it on equal footing with other options.

2.1.5.6 Future Outlook

Success of OSS through Java is dependent on the pervasive, or selectively pervasive, scope of user and supplier adoption. The large community of Java and J2EE users sets an important foundation layer. As the number of implementations grows, a point of critical mass will exist when the largest players become involved.

The key measure is in terms of service providers. Commitments from upwards of 10 of the top 25 to 50 global PTTs, ILECs, and CLECs will mark an important turning point. Prior to the finalization of the first phase of APIs, service provider activity was largely limited to the RFP process of searching out new investments. However, leading service providers are currently engaged in early work using the APIs.

OSS through Java has the potential to overhaul the capabilities of service providers by changing the makeup of service provider software. A key result of a newly simplified set of APIs might be to speed internal service provider operations or to accelerate the life cycle of commercial OSS and billing product development.

With a reduced emphasis on APIs, OSS and billing will focus more on issues like management of the processes including human-system workflows and management techniques for correlating and compiling analytical data.

OSS through Java is a validated approach to integration. It takes a broadly available technology — J2EE — and applies it to telecom. While the industry preference is to develop proprietary optimized systems — which often are ahead of broader IT market concepts — the corporate management teams, customers, and partners are becoming frustrated with the slow pace of change in telecommunications. Hyper-investment of the bubble era obscured the slow rates of development that are habitual in ILECs and PTTs particularly.

It is important not to underestimate the browser and email-driven software education of senior non-IT managers who have experienced faster development cycles. The success of Portals and Webcentric applications and the promise of Web services fuel the topdown initiatives within service providers to improve software practices and technologies.

Additionally, each of the specifications is comprised of a Java specification and an XML specification. Because many of the J2EE applications servers implement Java technologies for Web services, the efforts of the initiative are enabled for Web services.

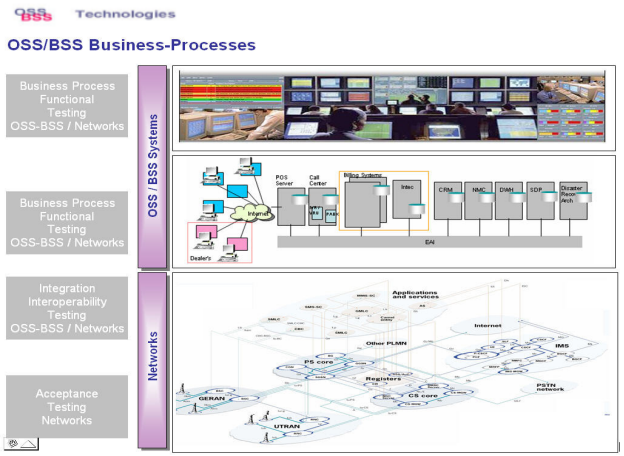

Figure 7

2.1.5.7 Industry Impact

Competing technologies and some distant alternatives are potential barriers to success. Software technology lies at the heart of the competitive discussion. Because the core technology is J2EE/Java, and a rival to the Java family comes from Microsoft's set of development products, OSS through Java is already subject to an "us versus them" situation of the larger IT industry. In particular, the Microsoft-sponsored OSS/BSS Working Group aims to apply Microsoft's XML/SOAP and .NET technologies to the OSS community.

Microsoft's relative weakness in core service provider markets does mitigate any type of head-to-head comparisons. However, a renewed commitment to wireless service providers and news in March 2002 that Deutsche Telekom's T-Mobile will adopt the .NET XML technologies does indicate a strengthened Microsoft service provider group.

The alternatives to OSS through Java APIs include the APIs embedded in the preconfigured OSS and billing solutions such as those offered by Cap Gemini Ernst & Young as well as specialists like Business Edge's velOSSity. Ultimately, a commercial EAI tool such as BEA, IBM WebSphere, TIBCO, or Vitria products power system integrator alternatives.

OSS and billing vendors also position the most popular EAI tools as a "standardized" interface to which their products are adapted. In this way, the profitable integration work or software extensions for APIs to EAI messaging buses are alternatives to OSS through Java. Because integration work has been a key source of revenue for many, especially system integrators, and the investments in pre-integrated solutions have been sizable, support
from system integrators will be an indicator of success.

Efforts to leverage Sun's Jini, JXTA, and similar technologies propose more futuristic options. The OSS through Java Initiative has been quietly building integration technologies during the past year. While marketing efforts of system integrators and OSS and billing vendors emphasized messaging buses as a way to minimize integration worries, the OSS through Java work continued.

Competition at the Java level and alternatives also appear as barriers to success. Along with OSS through Java, this set of technologies drives a lock-in situation and raises switching costs for the service providers. However our position in service provider infrastructure is a strongly incumbent one that supports OSS through Java.

It is probable that some APIs or groups of APIs within OSS through Java and other industry initiatives will experience lukewarm receptions or failure while others succeed. As the team moves forward to address additional functions, its choices are becoming increasingly strategic. Attention to the high-value areas of inventory and billing APIs at this still early but already proven stage of events bodes well for a comprehensive success.