

Amdocs Optima Digital Customer Management and Commerce Platform in the AWS Cloud

February 2018



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Abstract

Amdocs Optima is a digital customer management and commerce platform designed to rapidly and securely monetize any product or service. Serving innovative communications operators, Mobile Virtual Network Enablers/Operators (MVNE/Os), Tier 2 cable/PayTV and utilities, Amdocs Optima's open platform has been available on-premises but is now also available on the AWS Cloud.

This whitepaper provides an architectural overview of how the Amdocs Optima Business Support Systems (BSS) solution operates on the AWS Cloud. It is written for executive, architect, and development teams that need to make a decision to deploy a business support solution for their consumer or enterprise business on the AWS Cloud.

Introduction

For digital companies such as innovative communications operators, Mobile Virtual Network Enablers/Operators (MVNE/Os), Tier 2 cable/PayTV and utilities companies, focusing on the enterprise and small- and medium-sized enterprise (SME) business segments can deliver a significant increase in revenue and market share. However, when trying to execute on enterprise business strategy, many operators find that they lack the required capability to support the continuous demand for their corporate services. They find that their business support systems (BSS) platforms lack business flexibility and operational efficiency and are not cost effective. Key challenges include underperforming systems, the high cost of managing legacy operations, and maintaining regulatory compliance. Additionally, many companies need to adopt a pan-regional architecture in order to onboard additional countries, regions, customer verticals, and products. This situation demands a significant change in both revenue and customer management systems, as well as in the IT environment.

Amdocs Optima is a digital customer management and commerce platform designed to rapidly and securely monetize any product or service. Serving innovative communications operators, MVNE/Os, Tier 2 cable/PayTV and utility companies, its open platform can now be deployed in the AWS Cloud to support the entire business lifecycle of a service or product.

This whitepaper provides an overview of the Amdocs Optima platform and a reference architecture for deploying Amdocs Optima on AWS. We also discuss the benefits of running it on AWS and various use cases. By running on the AWS Cloud, Amdocs Optima is able to deliver significant required improvements to the operations and capabilities of customers in every vertical, while enabling future growth and expansion to new domains. You can also benefit from compliance and security credentials of AWS Cloud instead of incurring ongoing cost of audits related to storing customer data.

AWS Overview

AWS provides on-demand computing resources and services in the cloud, with pay-as-you-go pricing. As of this publication, AWS serves over a million active customers in more than 190 countries and is available in 18 AWS Regions worldwide. For the most current list of Regions and Availability Zones, see [AWS](#)

[Global Infrastructure](#).¹ You can access servers on AWS and log in, configure, secure, and operate them just as you would operate servers in your own data center.

When you use AWS resources for your compute needs, it's like purchasing electricity from a power company instead of running your own generator. AWS provides many of the same benefits, including:

- The capacity you get exactly matches your needs.
- You pay only for what you use.
- Economies of scale result in lower costs.
- The service is provided by a vendor who is experienced in running large-scale compute and network systems.

AWS Services for Deploying Amdocs Optima

This section describes the AWS infrastructure and services that you need to run the Amdocs Optima BSS platform on AWS.

Regions and Availability Zones

Each AWS Region is a separate geographic area that is isolated from the other Regions. Regions provide you the ability to place resources, such as Amazon Elastic Compute Cloud (Amazon EC2) instances and data in multiple locations. Resources aren't replicated across Regions unless you do so specifically.

An AWS account provides multiple Regions so that you can launch your applications in locations that meet your requirements. For example, you might want to launch your applications in Europe to be closer to your European customers or to meet regulatory requirements.

Each Region has multiple, isolated locations known as Availability Zones. Each Availability Zone runs on its own physically distinct, independent infrastructure and is engineered to be highly reliable. Common points of failure, such as generators and cooling equipment, aren't shared across Availability Zones. Each Availability Zone is isolated, but Availability Zones within a Region are connected through low-latency links.

For more information about Regions and Availability Zones, see [Regions and Availability Zones](#) in the *Amazon EC2 User Guide for Linux Instances*.²

Amazon Route 53

Amazon Route 53 provides highly available and scalable Domain Name System (DNS), domain name registration, and health-checking web services. It is designed to give developers and businesses an extremely reliable and cost-effective way to route end users to internet applications by translating names like *example.com* into the numeric IP addresses, such as *192.0.2.1*, that computers use to connect to each other. You can combine your DNS with health-checking services to route traffic to healthy endpoints or to independently monitor and/or alarm on endpoints. You can also purchase and manage domain names such as *example.com* and automatically configure DNS settings for your domains. Route 53 effectively connects user requests to infrastructure running in AWS – such as Amazon EC2 instances, Elastic Load Balancing load balancers, or Amazon S3 buckets – and can also be used to route users to infrastructure outside of AWS.

Amazon Elastic Compute Cloud

Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides resizable compute capacity in the cloud that is billed by the hour. You can run virtual machines (EC2 instances) ranging in size from 1 vCPU and 1 GB memory to 128 vCPU and 2 TB memory. You have a choice of operating systems including Windows Server 2008/2012, Oracle Linux, Red Hat Enterprise Linux, and SUSE Linux.

Elastic Load Balancing

Elastic Load Balancing (ELB) automatically distributes incoming application traffic across multiple EC2 instances in the cloud. It enables you to achieve greater levels of fault tolerance in your applications, seamlessly providing the required amount of load balancing capacity needed to distribute application traffic. You can use Elastic Load Balancing for load balancing web server traffic.

Amazon Elastic Block Store

Amazon Elastic Block Store (Amazon EBS) provides persistent block-level storage volumes for use with EC2 instances in the AWS Cloud. Each Amazon EBS volume is automatically replicated within its Availability Zone to protect you from component failure, thereby offering high availability and durability.

EBS volumes offer the consistent and low-latency performance needed to run your workloads.

Amazon Machine Image

An Amazon Machine Image (AMI) is a packaged-up environment that provides the information required to launch your EC2 instance. You specify an AMI when you launch an instance, and you can launch as many instances from the AMI as you need. For more information on AMIs, see the [Documentation](#).³ Amazon EC2 uses Amazon EBS and Amazon S3 to provide reliable, scalable storage of AMIs so that we can boot them when you ask us to do so.

Amazon Simple Storage Service

Amazon Simple Storage Service (Amazon S3) provides developers and IT teams with secure, durable, highly-scalable object storage. It provides a simple web services interface that you can use to store and retrieve any amount of data, at any time, from anywhere on the web. With Amazon S3, you pay only for the storage you actually use. There is no minimum fee and no setup cost.

Amazon Virtual Private Cloud

Amazon Virtual Private Cloud (Amazon VPC) lets you provision a logically isolated section of the AWS Cloud in which you can launch AWS resources in a virtual network that you define. You have complete control over your virtual networking environment, including selection of your own private IP address range, creation of subnets, and configuration of route tables and network gateways. You can leverage multiple layers of security, including security groups and network access control lists, to help control access to EC2 instances in each subnet. Additionally, you can create a hardware virtual private network (VPN) connection between your corporate data center and your VPC, and then you can leverage the AWS Cloud as an extension of your corporate data center.

Amazon Relational Database Services

Amazon Relational Database Service (Amazon RDS) is a web service that makes it easier to set up, operate, and scale a relational database in the cloud. It provides cost-efficient, resizable capacity for an industry-standard relational database and manages common database administration tasks.

AWS Auto Scaling

AWS Auto Scaling monitors your applications and automatically adjusts capacity to maintain steady, predictable performance at the lowest possible cost. Using AWS Auto Scaling, it's easy to set up application scaling for multiple resources across multiple services in minutes. The service provides a simple, powerful user interface that lets you build scaling plans for resources including [Amazon EC2](#) instances and Spot Fleets,⁴ [Amazon ECS](#) tasks,⁵ [Amazon DynamoDB](#) tables and indexes,⁶ and [Amazon Aurora](#) Replicas.⁷ AWS Auto Scaling makes scaling simple with recommendations that allow you to optimize performance and costs or balance between them. If you're already using [Amazon EC2 Auto Scaling](#) to dynamically scale your Amazon EC2 instances,⁸ you can now combine it with AWS Auto Scaling to scale additional resources for other AWS services. With AWS Auto Scaling, your applications always have the right resources at the right time.

AWS CloudTrail

With AWS CloudTrail, you can monitor your AWS deployments [in the cloud](#)⁹ by getting a history of AWS API calls for your account, including API calls made via the AWS Management Console, the AWS SDKs, the command line tools, and higher-level AWS services. You can also identify which users and accounts called AWS APIs for services that support CloudTrail, the source IP address the calls were made from, and when the calls occurred. You can integrate CloudTrail into applications using the API, automate trail creation for your organization, check the status of your trails, and control how administrators turn CloudTrail logging on and off.

AWS CloudFormation

AWS CloudFormation provides a common language for you to describe and provision all the infrastructure resources in your cloud environment. CloudFormation allows you to use a simple text file to model and provision, in an automated and secure manner, all the resources needed for your applications across all regions and accounts. This file serves as the single source of truth for your cloud environment.

AWS CloudFormation is available at no additional charge, and you pay only for the AWS resources needed to run your applications.

AWS Key Management Service

AWS Key Management Service (AWS KMS) gives you centralized control over the encryption keys used to protect your data. You can create, import, rotate, disable, delete, define usage policies for, and audit the use of encryption keys used to encrypt your data. AWS KMS is integrated with many other AWS services making it easy to encrypt the data you store in these services with encryption keys you control. AWS KMS is integrated with AWS CloudTrail, which provides you the ability to audit who used which keys, on which resources, and when. AWS KMS enables developers to easily encrypt data, whether through 1-click encryption in the AWS Management Console, or by using the AWS SDK to easily add encryption in their application code.

AWS Code Commit

AWS CodeCommit is a fully-managed [source control](#) service that makes it easy for companies to host secure and highly scalable private Git repositories.¹⁰ CodeCommit eliminates the need to operate your own source control system or worry about scaling its infrastructure. You can use CodeCommit to securely store anything from source code to binaries, and it works seamlessly with your existing Git tools.

AWS Simple Notification Service

Amazon Simple Notification Service (Amazon SNS) is a web service that makes it easy to set up, operate, and send notifications from the cloud. It provides developers with a highly scalable, flexible, and cost-effective capability to publish messages from an application and immediately deliver them to subscribers or other applications. It is designed to make web-scale computing easier for developers. Amazon SNS follows the [“publish-subscribe” \(pub-sub\) messaging paradigm](#),¹¹ with notifications being delivered to clients using a “push” mechanism that eliminates the need to periodically check or “poll” for new information and updates. With simple API actions requiring minimal up-front development effort, no maintenance or management overhead and pay-as-you-go pricing, Amazon SNS gives developers an easy mechanism to incorporate a powerful notification system with their applications.

AWS Direct Connect

AWS Direct Connect makes it easy to establish a dedicated network connection from your premises to AWS. Using AWS Direct Connect, you can establish private connectivity between AWS and your data center, office, or colocation

environment, which in many cases can reduce your network costs, increase bandwidth throughput, and provide a more consistent network experience than internet-based connections.

AWS Security and Compliance

The AWS Cloud security infrastructure has been architected to be one of the most flexible and secure cloud computing environments available today.¹² Security on AWS is similar to security in your on-premises data center, but without the costs and complexities involved in protecting facilities and hardware. AWS provides a secure global infrastructure, plus a range of features that you can use to help secure your systems and data in the cloud. To learn more about AWS Security, see the [AWS Security Center](#).¹³

AWS Compliance enables you to understand the robust controls in place at AWS to maintain security and data protection in the cloud. AWS engages with external certifying bodies and independent auditors to provide you with extensive information regarding the policies, processes, and controls established and operated by AWS. To learn more about AWS Compliance, see the [AWS Compliance Center](#).¹⁴

Amdocs Optima Platform Overview

In this section, we cover the major capabilities of the Amdocs Optima Digital Customer and Revenue Management platform, its technical architecture, and how the architecture is deployed on AWS.

Amdocs Optima Capabilities

At a high level, Amdocs Optima provides capabilities in the digital engagement, commerce, customer management, network integration, online and offline rating, and charging, billing, commerce, and financial integration domains.

Amdocs Optima offers a rich set of pre-integrated features to get you up and running quickly. It includes the following major capabilities:

Converged billing and digital commerce platform

- Swift onboarding onto the platform in under six months

- Time to market for new products, services, and bundles in minutes instead of months
- Simple, table-driven configuration that doesn't require coding to create new products, service offerings, and bundles

Future-ready and open

- Best of suite solution offering rich pre-integrated capabilities, including omni-channel engagement, order management, product catalog, offline billing, as well as activation and provisioning solution
- Ready to deploy single or multiple lines of business across geographies and industries
- Over 300 open-standard, partner-friendly, pre-integrated REST application programming interfaces (APIs) that enable easy integration with third-party applications
- Security and compliance provided through both AWS Cloud and the Amdocs Optima architecture

Purely digital solution

- Commerce engine to drive online sales
- Multiple channels user interfaces (UIs), self-service-first as a paradigm, tenant portal, social media, chatbots, Contact center, point of sale
- Artificial Intelligence solutions to enhance sales and operations (optional)

Lean

- DevOps, agile methodologies
- Multi-tenancy
- Cloud or on premises (hardware efficient)
- New business models with optimal investments in business support systems

Amdocs Optima accommodates a vast library of connectors for applications, platforms, and communications protocols including Salesforce, DropBox, Facebook, Hadoop, session-initiated protocol (SIP), and many others.

Leveraging a set of intuitive and responsive UIs and the Omni-Channel Experience solution, Amdocs Optima enables efficiency and simplicity across multiple devices, such as desktop, laptop, tablets, and smartphones.

Amdocs Optima Architecture

Functional Layers

The Amdocs Optima technical architecture is organized into three functional layers (see Figure 1), which are discussed in this section.

Amdocs Optima High Level Architecture

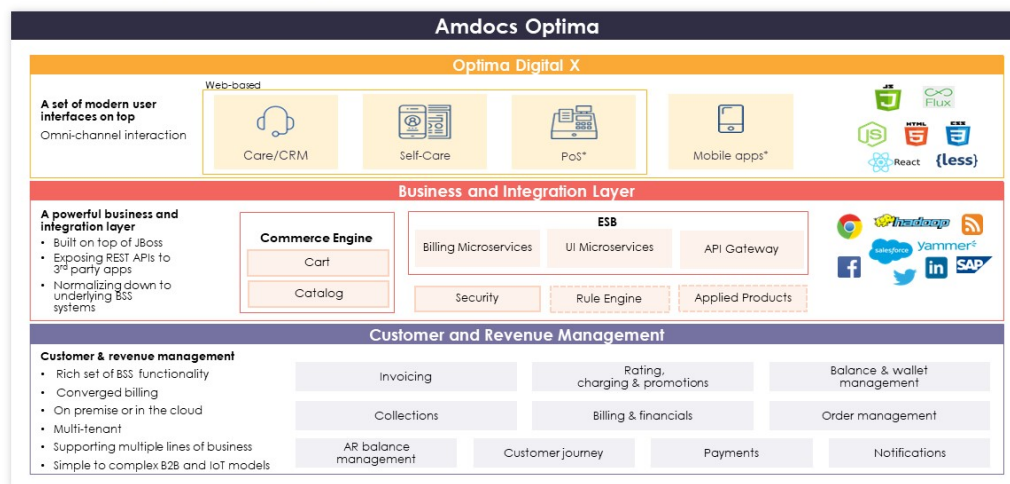


Figure 1: Amdocs Optima technical architecture

Digital Channels (Digital X) Layer – Provides the interface for all digital channels. It is implemented in a React or Redux JavaScript framework using a widget library that provides responsive web presentation across multiple device form factors.

Business and Integration Layer – Built on JBoss Fuse, this layer exposes Representational State Transfer (REST) APIs, including over 300 ready-to-use connectors, from an enterprise service bus (ESB) to integrate with both the UI layer and third-party applications. These APIs underpin service-oriented architecture (SOA)-based integrations and architectures for faster and lower-cost deployments.

The business integration layer is implemented using the following components:

- JBoss FUSE ESB
- Configurable service layer logic (via Apache Camel routes)
- Apache CXF service framework (provides REST interface)
- Identity management and security framework using RedHat SSO
- API management via RedHat APIMan
- Ordering modules, quote server, request handling and tracking, and inventory replenishment
- Omni-Channel shopping cart
- Business catalog

Customer and Revenue Management Layer – This layer offers the following capabilities:

- Rating and discount modules include near real-time rating (NRTR) and advanced rating and discounts (both online and offline) via the online charging system and offline rating engines.
- Billing modules include cyclic billing, invoice designing, and advance invoice numbering.
- Financial modules include payments and adjustments, collections, and reports.

Database – System information is stored across various databases. The multiple-database architecture provides scalability, while keeping common configuration data separate from account and financial data.

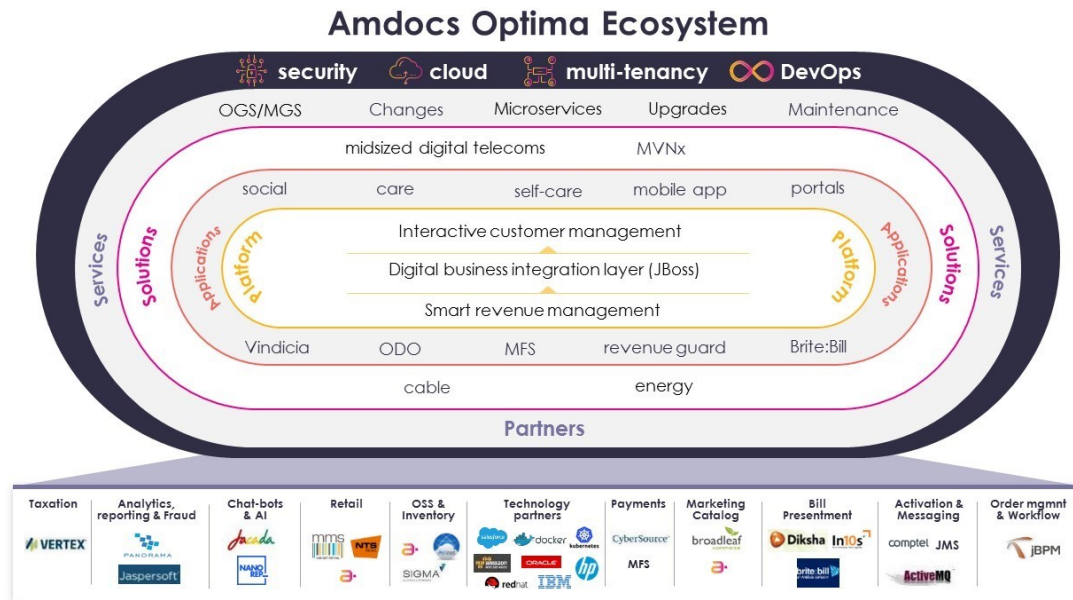


Figure 2: Amdocs Optima as a platform

Technical Architecture Description

The description of capabilities that each layer of the technical architecture enables are represented in the following diagram:

Amdocs Optima Digital X (Digital Engagement Channels) Layer Capabilities

- Responsive, multi-modal web presentation layer
- Native mobile application
- Self-care as a paradigm – Design-led web interface allowing you to leverage the self service capability
- Care (CSR) – Customer Service Representatives interfaces
- Tenant portal widget library – Reusable UI components and underlying presentation logic

Business and Integration Layer Capabilities

- Identity management – Authentication, roles, user management, and single sign-on.

- Security, usage throttling, SLAs – Authorization, metrics, and SLA enforcement around exposed northbound APIs.
- REST APIs – API framework to deliver business services via a standardized REST API model.
- Configurable service logic – Orchestration of underlying APIs to deliver business-oriented functions, enhanced flexibility, and extensibility.
- Data mapping – Management of the Amdocs Optima data model and virtualization of southbound application data models.
- Business catalog – Rules around which products may be sold to which accounts, which products can be sold together, which products are incompatible, etc. Rules can be based on account segment, hierarchy, geography, equipment, serviceability, or any number of other factors and defined business processes, serving both B2B and B2C customers.
- Shopping cart – Product browsing and search, cart item management (including product options and features), and pricing/quoting.
- Transaction management – Compensation capabilities for transactions that span the application domain, ensuring a coherent business transaction to northbound interfaces.
- Messaging – Asynchronous message queuing technology with persistence for internal event notification and synchronization and routing to the relevant professional (system admin, CSR, etc.).
- Application connector – Technical connection and protocol management to southbound APIs.

Customer and Revenue Management Layer Capabilities

- Customer management – Definition of customer profiles, customer interactions, and customer hierarchies, supporting simple to extremely complex B2B hierarchies and B2C scenarios.
- Order management – Processing of billing-related products and their elements prior to order fulfillment. This can include editing or cancelling pending orders, or forcing pending orders to immediately activate workflow-driven processes configured to meet business needs.
- Inventory – Manages serialized logical inventory (e.g., phone numbers and international mobile subscriber identities (IMSI)) for association to

billing products. Inventory can be categorized by type/line, with co-requisite rules defined in the catalog (e.g., data service requires a cable modem). Inventory placeholders and “golden” numbers are also supported.

- **Billing catalog** – Definition and management of products related to the billing operation. Products and their elements include rate plans, discount plans, recurring and non-recurring charges, and associated configuration. Product lifecycle allows for advance sales windows, sunseting, etc.
- **Order fulfillment** – A workflow-driven process to provision and activate billing orders in the system. This involves instantiation of the relevant products to their respective customer databases. Milestones in the workflow may also be defined to call out to third-party systems (e.g., for network activation). Manual nodes as well as error and cancel paths are also supported.
- **Resource management** – Manages dynamic lifecycle policy for all resources.
- **Voucher management** – Manages voucher lifecycle, voucher batches, card details, and card generation.
- **Usage file processing** – Integrity checks on the input usage files before passing to rating.
- **Rating engine** – Offline and online rating for prepaid and postpaid subscribers. The rating engine can use multiple factors related to the subscriber/account, the service and so on, to calculate the price for usage.
 - **Offline rating engine** – File-based offline rating, typically for postpaid subscribers.
 - **Online rating engine** – Real-time rating and promotional calculations based on network events.
 - **RC/NRC (non-prepaid)** – Calculates and applies recurring and non-recurring charges as part of the bill calculation.
- **Rated usage management** – Persistence and indexing of billed, unbilled, non-billable usage, and usage details.

- **Bill Preparer (BIP)** – Identifies accounts within a particular bill cycle, gathers data for bill processing, calculates billable charges, and generates processed information for bill formatting.
- **Bill-time (BT) discount** – Calculates bill-time discounts based on total usage for the period, total charges, applicable discount tiers, etc.
- **Bill-time (BT) taxation** – Calculates appropriate taxes given the geography, account information, installed tax packages, etc.
- **Invoice generator (IGEN)** – Combines the processed bill information from the BIP with invoice formats from the Invoice Designer to produce formatted bills. Supported formats include PDF and XML for export into other bill printing, dispatch, or online bill presentment services. The IGEN supports conditional logic in the templates, multi-language presentation formats, etc.
- **Accounts receivable (AR) balance management** – Applies bill charges to an account's AR balances. Thresholds defined against the balance may trigger notifications and/or lifecycle state changes.
- **Payments** – Requests for payment, payment history, and payment profiles.
- **Adjustments/refunds** – Allows for charges to be disputed, adjusted, or fully refunded. A manager approval mechanism with workflow ensures that all adjustments have been reviewed and authorized. Adjustments can be line items, or "goodwill" adjustments that are not based on a specific charge.
- **Journal (general ledger – G/L) feeds** – Reporting function that maps all financially significant activities in the system to operator-defined general ledger codes. Journaling generates feed files on a regular basis with the charges, organized based on the specified codes and categories. These files are then imported into the operator's account systems.
- **Collections** – Workflow-driven process whereby past-due bills trigger various external notification and collection activities (form letter, agency call, etc.) ultimately leading to debt resolution or write-off. Interfaces are provided to restore account state upon successful collection action.
- **Recharge/top-up** – Balance allotments and related promotions triggered via recharge actions.

- **Balance management** – Full lifecycle of cyclical authorization balances updated in real time.
- **Online promotions** – Real-time bonus awards and discounts, applied immediately to balances.
- **Notifications** – Threshold-based external notifications, for example, triggered in response to low balance.
- **SCP (service logic)** – Configurable logic to map network events to application actions (e.g., rating request).
- **Provisioning** – Executes the network provisioning processes of all ordered services on various network elements – including home location registers (HLRs), voicemail servers, over-the-air (OTA) servers, media servers, home subscriber servers (HSS), and others.
- **Network protocol integration** – Supports Authentication, Authorization, and Accounting (AAA) functionality for all types of online and offline charging as well as major network protocols. For voice networks, it incorporates session control point (IN-SCP) functionality, while also acting as an intelligent peripheral (IP). Data traffic is handled via DIAMETER.

Benefits of Amdocs Optima

Configurability, smart interoperability, and consistent experience – Amdocs Optima provides configurability while implementing a high level of complexity. It enables you to capitalize on digital era opportunities by growing your business with an open system that seamlessly interacts with ancillary apps.

Furthermore, it offers the freedom to address a diverse set of product and service markets, as well as a range of end-customer types. Encompassing a set of established and progressive BSS products, Amdocs Optima represents proven functionality under a pre-configured, industry-standard integration layer.

Flexible deployment – You can deploy Amdocs Optima on the AWS Cloud or in a legacy data center infrastructure.

Support for multi-tenancy – Multi-tenancy capabilities allow for a “define once, utilize many” strategy, as different tenants are hosted on a single hardware and software platform that is operated in one location. By leveraging

significant commonalities and using existing infrastructure, mid-sized digital service providers can gain a superior return on investment (ROI). In parallel, Amdocs Optima's flexibility lets you define and localize operations, including unique branding, invoice customizations, a variety of languages and currencies, and many other operational elements.

Support for multiple lines of business – Within a single instance or tenant, Amdocs Optima supports any number of lines of business (mobile, fixed-line, broadband, cable, finance, and utilities) and leverages a flexible catalog to offer converged services to a sophisticated market.

Flexibility – Includes support for subscription, usage-based, and “billing as a service” models over multiple networks and protocols of any kind, and across borders. In addition, it supports any service, product and payment method, as well as multiple currencies and languages.

Charging models – The solution supports prepaid, postpaid, and converged billing and charging models.

Functional footprint – Amdocs Optima incorporates a full range of revenue and customer management functions and tools. These include industry-agnostic data models that support any line of business – from traditional service providers and multiplay operators to providers of generic enterprise services.

Release planning – The Amdocs Optima deployment effort is driven by an agile release process, which enables the introduction of new capabilities within a 90-day cycle. This enables re-prioritization of core efforts based on customer need, while still driving toward a clear product end-state.

Amdocs Optima BSS Deployment Architecture on AWS

Amdocs Optima deployed on AWS provides a full BSS solution for operators in a variety of industries. The entire business support system cycle included in the Lead-to-Order-to-Cash process is supported in a flexible, robust platform. When deployed in the AWS Cloud, the architecture supports all modules including:

- Revenue management
 - BIP, IGEN, AR module, Journals, Electronic Funds Transfer, Lockbox, MPS (Rating)
 - Amdocs Optima data extracts and reports
- Customer care
 - Customer center, Amdocs Optima GUI (Payments, Event Investigation Units, Collections)
 - Security server and ops center
- Optima Integrated Salesforce Connector

Amdocs Optima Deployment in AWS Cloud

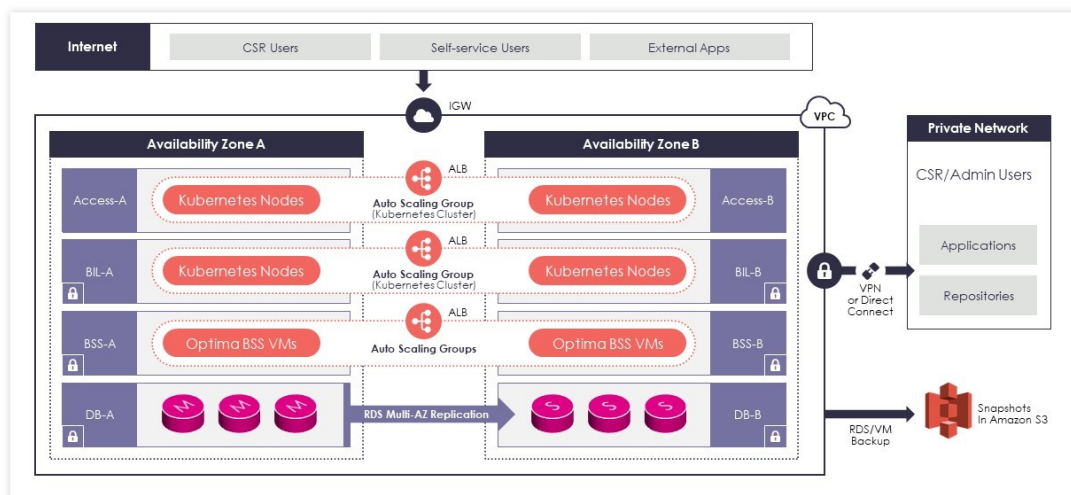


Figure 3: Amdocs Optima components deployed in AWS

In a typical client implementation supporting key business processes, the Amdocs Optima team creates, configures, and manages five Amazon VPC environments using your AWS account. The five environments are as follows:

- DEV VPC – dedicated VPC for development
- JIT VPC – dedicated VPC for joint integration testing
- UAT VPC – dedicated VPC for user acceptance testing
- PROD VPC – dedicated VPC for production

- MGMT VPC – separate VPC with VPC peering to the above VPCs

A typical deployment includes the following solution components:

- A centralized NTP server for all EC2 instances to synchronize system clocks
- Scheduling and security auditing
- User identity management server
- Vulnerability scanning of VPC resources
- Application monitoring proxy for Nagios to monitor Amdocs Optima applications

AWS Architecture Principles for Deploying Amdocs Optima

Each Amdocs Optima environment is implemented with the following principles:

- Two or more Availability Zones are used per AWS Region.
- The VPC is divided into four tiers of subnets, with four subnets in each Availability Zone.

For each DEV, JIT, or UAT environment, the platform is deployed in an Amazon Virtual Private Cloud (VPC) using primarily the following AWS services and resources:

- Public and private subnets within each VPC for access control.
- Multi (two) Availability Zones (AZ) to support fault tolerance from components and/or AZ failures.
- Amazon RDS instances running for application databases.
- Amazon EBS-backed EC2 instances with snapshots.
- Elastic Load Balancing (ELB) load balancer for providing end points to CRM.
- Auto Scaling Group (ASG) for automatic recovery of EC2 instances.

- Amazon Route 53 hosted DNS zone for providing end points for external and internal access with automatic DNS record updates.
- Security Groups to ensure restricted access to all EC2 instances on as-needed basis only.
- Amazon S3 service for storage of data and log files, backups, and miscellaneous files.
- VPC endpoints for private access to Amazon S3.
- NAT Gateway service for outbound traffic from VPC to CRM and NTP services.
- VPN service for private connectivity between the VPC and customer networks.
- AWS Identity and Access Management (IAM) service for managing user access to AWS.
- AWS Key Management Service for managing all encryption keys.
- AWS CloudTrail for tracking all AWS API/user events.
- AWS CloudFormation for provisioning automation of AWS resources.
- Amazon CloudWatch for performance monitoring.
- Amazon Simple Notification Service (SNS) for alarm and event notifications.
- AWS CodeCommit for version managing AWS infrastructure automation scripts.

Amdocs Optima Platform Deployment Architecture on AWS

In this section, we provide a sample deployment architecture for the Amdocs Optima platform on AWS Cloud. The actual deployed Amdocs Optima architecture varies depending on your specific customer needs. We recommend that you contact your Amdocs team to ensure accurate dimensioning of your architecture based on number of subscribers and other dimensioning parameters.

Infrastructure Component	# of Instances	AWS Instance Type	Operating System or Database	Volume Storage Type	Volume Type	Volume Storage (GB)
Windows Bastion	1	t2.small	Windows	EBS	General Purpose (SSD)	40
Linux Bastion	1	t2.small	RHEL	EBS	General Purpose (SSD)	12
OAG Server	2	c4.xlarge	RHEL	EBS	General Purpose (SSD)	80
OAG DB	1+1	db.r3.large	RDS DB	EBS	General Purpose (SSD)	100
OAG Admin Node Manager	1	c4.xlarge	RHEL	EBS	General Purpose (SSD)	80
OAG Studio	1	t2.medium	Windows	EBS	General Purpose (SSD)	40
ArcSight Connector	1	t2.medium	RHEL	EBS	General Purpose (SSD)	40

Sample Amdocs Optima Management Function Deployment Dimensioning

In addition to the Amdocs Optima platform, you need to deploy the management layer for the platform on the AWS Cloud. In this section, we describe the sample management function deployment resource dimensioning that we used to test the Amdocs Optima BSS solution on the AWS Cloud.

Infrastructure Component	# of Instances	AWS Instance Type	Operating System	Volume Storage Type	Volume Type	Volume Storage (GB)
Windows Bastion	1	t2.small	Windows R12	EBS	General Purpose (SSD)	40
Linux Bastion	1	t2.small	RHEL 7.2	EBS	General Purpose (SSD)	8
Scheduler	1	t2.micro	RHEL 7.2	EBS	General Purpose (SSD)	8

Infrastructure Component	# of Instances	AWS Instance Type	Operating System	Volume Storage Type	Volume Type	Volume Storage (GB)
NTP Server	1	t2.micro	RHEL 7.2	EBS	General Purpose (SSD)	10
IdM Server	1	t2.small	RHEL 7.2	EBS	General Purpose (SSD)	50
App Monitor	1	t2.small	RHEL 7.2	EBS	General Purpose (SSD)	20
Scan Engine	1	t2.large	Ubuntu 14.04	EBS	General Purpose (SSD)	10

Benefits of Deploying Amdocs Optima BSS in the AWS Cloud

There are many benefits of deploying the Amdocs Optima BSS platform on AWS:

Lower total cost of ownership – In an on-premises environment, it is typically necessary to pay for hardware, hardware support costs, virtualization licensing and support, and data center costs, including floor space, electricity, etc. These costs can be eliminated or dramatically reduced by moving to AWS. Benefits include economies of scale and efficiencies provided by AWS. You only pay for the compute, storage, and other resources that you use.

Cost savings for nonproduction environments – Amdocs Optima BSS on AWS enables you to shut down nonproduction environments when they are not being used in order to save costs. For example, if a development environment is used for only 40 hours a week (8 hours a day, 5 days a week), you would only pay for 40 hours of Amazon EC2 compute charges, as opposed to 168 hours based on 24/7 usage in an on-premises environment. This represents up to a 75% savings.

Replace CapEx with OpEx – You can implement an Amdocs Optima BSS solution or project on AWS without any upfront cost or commitment for compute, storage, or network infrastructure.

Unlimited environments – An on-premises environment usually provides a limited set of environments to work with—provisioning additional environments can take a long time or might not be possible. With AWS, you can create virtually any number of new environments in minutes as required.

In addition, you can create separate environments for each major project, thereby enabling each of your teams to work independently with the resources they need. Teams can subsequently converge in a common integration environment when they are ready. At the conclusion of a project, you can terminate the environment and cease payment.

Right size anytime – Customers often over-size on-premises environments for the initial phases of a project, but are subsequently unable to cope with growth in later phases. With AWS, you can scale your compute usage up or down at any time. You pay only for the individual services you need, for as long as you use them. In addition, you can change instance sizes in minutes through the AWS Management Console, the AWS Application Programming Interface (API), or Command Line Interface (CLI).

Low-cost disaster recovery – You can build low-cost standby disaster recovery environments for existing deployments. Costs are incurred for the duration of any outage that occurs.

Ability to test application performance – Although performance testing is recommended prior to any major change to an Amdocs Optima BSS solution environment, most customers only performance test their Amdocs Optima BSS application during the initial launch in the yet-to-be-deployed production hardware. Later releases are usually never performance tested due to the expense and lack of environment required for performance testing. AWS minimizes the risk of discovering performance issues later in production. You can create an AWS Cloud environment easily and quickly just for the duration of the performance test and only use it when needed. You are charged only for the hours the environment is used.

Simple integration from Amdocs Optima to AWS Cloud for analytics and machine learning – Amdocs Optima platform offers rich product and service management capabilities which can be integrated with AWS Cloud Analytics for use cases such as subscriber, customer, and usage analytics. These

can then be used for various loyalty and retention programs leveraging machine learning models on AWS Cloud using services like Amazon SageMaker.

No end of life for hardware or platform – All hardware platforms have end-of-life dates, at which point the hardware is no longer supported and you are forced to purchase new hardware again. AWS requires only a simple upgrade of your platform instances to new AWS instance types (via a single click) without incurring any cost.

Conclusion

Amdocs Optima is a pre-integrated, end-to-end digital customer management and commerce platform designed to rapidly and securely monetize any product or service. The richness of Amdocs Optima's capabilities and flexibility—a strong BSS engine enabled by modern, digital, open source components such as JBoss Fuse, REST APIs, React, Node.js, and other advanced technologies—allows you to enjoy the superior performance of a well-proven solution implemented around the world.

Amdocs Optima combined the effectiveness of a lean architecture and future readiness to provide you the ability to step into the digital economy. By deploying Amdocs Optima in the AWS Cloud, you can increase deployment velocity, reduce infrastructure cost significantly, and integrate with IoT, analytics, and machine learning services. You can further leverage the compliance benefits of AWS Cloud for sensitive customer data. AWS can be a cost-effective, secure, scalable, high-performing, and flexible option for deploying Amdocs Optima Business Support Systems.

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About Amdocs

Amdocs is a leading software and services provider to the world's most successful communications and media companies. As our customers reinvent themselves, we enable their digital and network transformation through innovative solutions, delivery expertise and intelligent operations. Amdocs and its 25,000 employees serve customers in over 85 countries. Listed on the NASDAQ Global Select Market, Amdocs had revenue of \$3.9 billion in fiscal 2017. For more information, visit Amdocs at www.amdocs.com.

Notes

- ¹ <https://aws.amazon.com/about-aws/global-infrastructure/>
- ² <http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using-regions-availability-zones.html>
- ³ <https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/AMIs.html>
- ⁴ <https://aws.amazon.com/ec2/>
- ⁵ <https://aws.amazon.com/ecs/>
- ⁶ <https://aws.amazon.com/dynamodb/>
- ⁷ <https://aws.amazon.com/aurora/>
- ⁸ <https://aws.amazon.com/ec2/autoscaling/>
- ⁹ <https://aws.amazon.com/what-is-cloud-computing/>
- ¹⁰ <https://aws.amazon.com/devops/source-control/>
- ¹¹ <https://aws.amazon.com/pub-sub-messaging/>
- ¹² https://d0.awsstatic.com/whitepapers/Security/Intro_to_AWS_Security.pdf
- ¹³ <https://aws.amazon.com/security/>
- ¹⁴ <https://aws.amazon.com/compliance/>