

Dialogic® ControlSwitch™ System

Transform Your Network into a Powerful Service Delivery Machine

The Dialogic® ControlSwitch™ System is an IP softswitch that provides a smooth migration path from existing TDM voice networks to the Next Generation Network/IP Multimedia Subsystem (NGN/IMS) by enabling the interconnection of a mix of traditional and IP-based voice networks. The ControlSwitch System is built around an advanced modular, programmable, distributed, highly scalable, and high availability architecture with open interfaces to media devices, application servers, and back office systems.

The ControlSwitch System is designed for cost-effective scalability and configuration flexibility, with open interfaces and interoperability at all layers to allow service providers to create a comprehensive solution portfolio. The ControlSwitch System can smoothly integrate with a service provider's existing back office and Operational Support (OS) Systems and includes built-in real-time service level assurance and revenue protection mechanisms.



Features	Benefits
Seamless connectivity between TDM, VoIP, and IMS networks	Enables convergence of disparate networks and multi-protocol support
On-the-fly service programmability and extensibility	Permits customized solutions
Single point of management that includes Call Detail Records (CDR) and call tracing	Centralized management supports network-wide deployments
Geographic redundancy	Provides high availability and disaster recovery
Integrated security solution	Allows secure VoIP interconnects
Gateway Mobile Switching Center (MSC) functionality	Enables optimal routing in environments that include wireless networks
Scalable and open platform	Scalable design avoids the need for forklift upgrades to expand capacity. Ability to interoperate with other media gateway vendors provides investment protection.

Moving to Packet-Based Technologies While Leveraging Circuit-Switched Voice Networks

Service providers face a complex set of challenges. Worldwide deregulation has increased the level of competition, forcing service providers to find new approaches to attract and retain profitable customers.

The new competitive environment and the rise of new modes of internet communication have reduced the profitability potential of the traditional Public Switched Telephone Network (PSTN). To compete, service providers must overcome the technical and financial hurdles of moving to increasingly efficient packet-based technologies and services while still leveraging existing circuit-switched voice networks.

In an environment replete with vendors offering proprietary vertical solutions, Dialogic provides open and interoperable solutions consistent with the intent of various standards bodies including the Third Generation Partnership Project (3GPP), Internet Engineering Task Force (IETF), International Telecommunication Union (ITU), and other proponents of distributed architecture principles and systems concepts.

Handling Packet Protocols

In order to maintain a competitive edge via reduced costs and increased service revenue, carriers around the world are looking to transition their current legacy voice services to Voice over Internet Protocol (VoIP). This migration calls for an innovative, open-standards packet-switched network that is flexible and can enable rapid deployment of new revenue generating services while reducing operating costs. The ControlSwitch System is well-suited to achieve this, and more.

The ability of the ControlSwitch System to mediate between various packet protocols (such as MGCP, H.323, SIP, and H.248) and global PSTN signaling protocols (SS7, PRI, CAS R1/R2) and variants gives service providers the flexibility to fully utilize existing resources and deliver a wide variety of enhanced services via any type of network. Additionally, the ControlSwitch System provides a cost effective migration strategy that leverages existing service investment and provides a clear path to an all-IP based IMS network.

Deploying New Services on a Single Platform

The open-standards, multi-protocol, multi-services ControlSwitch System platform enables new services to be implemented dynamically throughout the entire network - that is, service providers can deploy new services and solutions without the overhead of running multiple disparate networks or incurring downtime to reconfigure the network. Additional processing capacity is added using Common Off-the-Shelf (COTS) computing platforms.

For an illustration of a multi-service ControlSwitch System deployment example, see Figure 1.

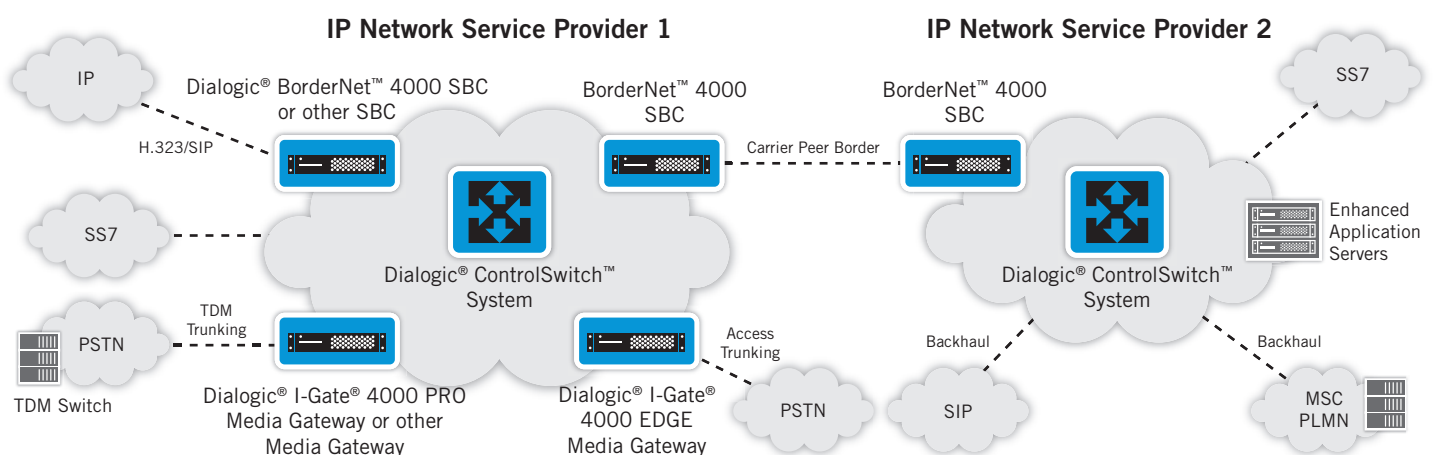


Figure 1. Multi-Service Dialogic® ControlSwitch™ System Deployment

The ControlSwitch System includes a service delivery platform based on programmable, configurable, and dynamic loading of XML service scripts. This empowers customers to design, develop, deploy, activate, and tailor their service offerings on the fly, thus gaining control of their market differentiation.

The rapid creation of a wide range of differentiated enhanced services can be delivered from both the ControlSwitch System and third-party application servers.

A Multi-Tiered Reference Model with a Single Point of Management

The ControlSwitch System provides an unparalleled solution set for meeting the requirements of the next-generation multi-tiered reference model. The ControlSwitch System design allows for high scalability in granular increments — yielding an optimized solution for both initial and large-scale deployments. For instance, service providers can choose to centralize system management, billing subsystem, service logic, and routing, and distribute call control and signaling to various regional centers. In this way, an additional investment to support traffic growth is aligned with revenue growth without confronting scalability limits.

Regardless of the distribution of ControlSwitch System elements across multiple locations, Dialogic provides a single point of management for configuration, provisioning, and system monitoring, including real-time alarms, performance statistics, and traffic reports. In addition, the ControlSwitch System provides a single view of Call Detail Records (CDR) and provides end-to-end call tracing as an invaluable troubleshooting tool.

Various elements of the ControlSwitch System can be distributed geographically for scaling and redundancy — a primary element may be located in a city and can be backed up by the secondary element located in a different switching center even in a different city.

Open and Flexible Solutions Designed to Meet Many Needs

The ControlSwitch System has proven openness at all interface layers to enable service providers to rapidly interoperate with new vendors of media hardware and application servers. Additionally, the ControlSwitch System is a core element in solutions that incorporate products from Dialogic partners. Dialogic offers numerous field deployed solutions interoperable with specialized products from its partners. Therefore, service providers can quickly exchange traffic with other service providers and deploy services from Dialogic and its partners to help increase their revenue.

Real-Time Collection of Detailed Statistics

The ControlSwitch System incorporates the real-time collection of detailed statistics used for VoIP traffic prioritization and bandwidth utilization control. The network and application layer statistics collection system in combination with the Policy Engine enable advanced Quality of Service (QoS) Management and Service Level Agreements (SLAs) design. SLAs can be customized — per customer, per interconnection partner, per service, etc. The QoS element enables carriers — network-wide and in real time — to automatically obtain feedback and take corrective action to maintain custom SLAs.

Dashboard Functionality

The ControlSwitch element management system offers a dashboard into the service provider's network. However, for service providers with a large investment in existing back office systems including provisioning, billing, and network operations, the ControlSwitch System offers many open interfaces including PL/SQL and XML for provisioning, SNMP for network management and text based CDRs for billing. ControlSwitch can also be deployed with back office traffic monitoring systems that require call status tracking in real time. Alternately, this application can also be used by operators wishing to record traffic patterns in real time.

Security Features

The ControlSwitch System provides security features to enable service providers to prevent malicious attacks on their network and fully protect their customers' assets. These features include topology hiding to hide internal network and customer details, access control lists, and "denial of service" attack prevention, and far-end and near-end NAT traversal to avoid NAT/Firewall complications.

"Virtual Mesh" Tandem Switching

The market for mobile voice services is characterized by growth and constant churn in the customer base. To support this, wholesale network service providers and/or wireless service providers need to frequently add tandem switching and trunk capacity to connect new and existing Mobile Switching Centers (MSCs) and Gateway MSCs (G-MSCs) with each other. The investment by traditional TDM solutions to support this need is disproportionately high and is not realistically sustainable in a market with declining prices and margins. The ControlSwitch System provides a next-generation solution to this issue by delivering a highly efficient, distributed "virtual mesh" tandem switching solution, along with substantial bandwidth savings opportunities and toll quality voice over packet networks.

Service Broker Functionality

The ControlSwitch System delivers Service Broker functionality based on a unique and open architecture such as MSF and 3GPP. This provides a real-time transactional integration for significantly reduced integration cost, and it provides a bridge to web services. The architecture also enables: integration of best-of-breed service applications from multiple vendors; services scalability from 1-to-N application servers; service execution in a heterogeneous environment (that is, SIP, INAP); co-existence and quick delivery of services between legacy and next generation networks; delivery of new service business models and fast service customization without the burden and costs involved in forklift upgrades.

Helps Meet Specific Economic and Functional Requirements

Based on its open architecture, the ControlSwitch System provides ubiquitous, simultaneous multi-function capability across a broad range of applications. Because the call control and application elements of the ControlSwitch System are independent from the actual switching hardware, solutions deployment and implementation can be tailored according to a service provider's specific economic and functional requirements. This represents a significant departure from traditional solutions that employ embedded control and applications software with limited flexibility.

The ControlSwitch System is a fundamental component of Dialogic's IMS-compliant solution, which enables the coexistence of legacy and IP networks and flawless migration of service provider customers to a full IMS-NGN.

ControlSwitch System Elements

The ControlSwitch System is a multi-tiered, highly scalable, distributed software system that executes on commercial Oracle servers, interconnected over an underlying IP data network. A service provider can elect to start with a small system and grow it to a very large one, spanning multiple geographic centers, by adding components as the traffic and end-user volume increase. At a high level, the ControlSwitch System can be described as a distributed, IP network-based system providing traditional switch functions of call control, call routing, signaling gateway, and media device control in addition to back office functions in support of provisioning, billing, and network operations. The building blocks or elements of the ControlSwitch System are depicted in Figure 2.

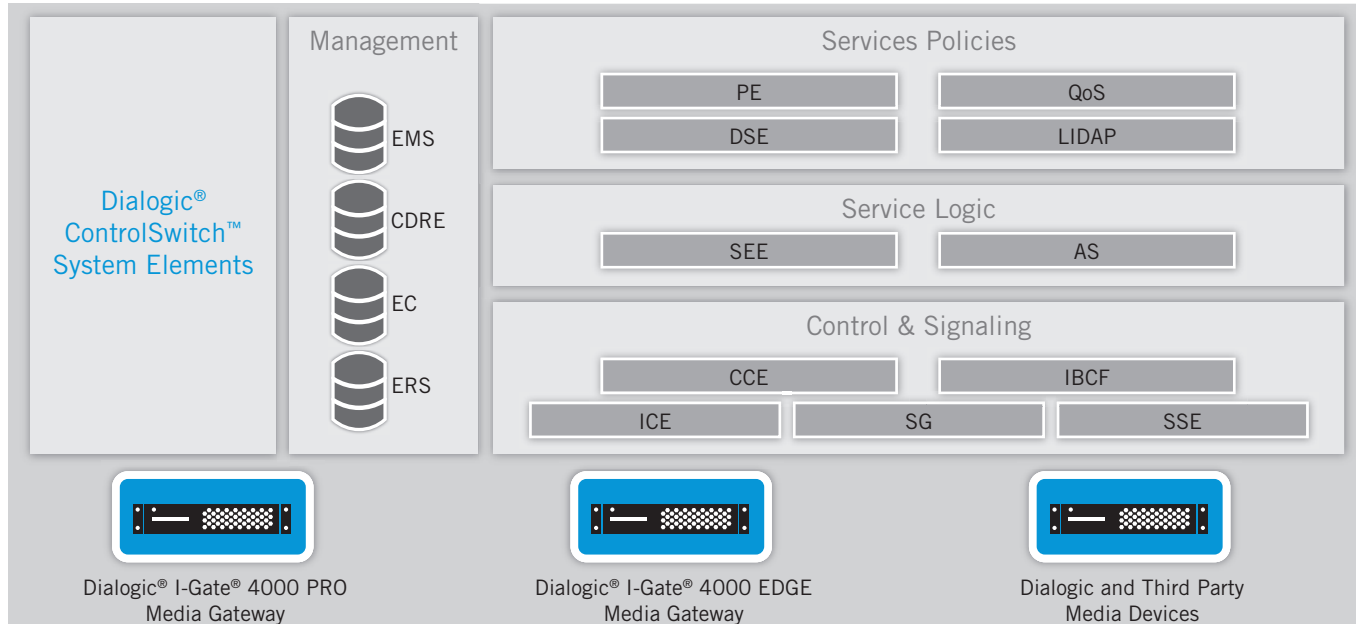


Figure 2. Modular Reference Architecture

Element Descriptions

Element Management System (EMS)

The EMS provisions all ControlSwitch System components and enables the modular and distributed network solution to be easily managed from a single switch. It proactively monitors the status of the system's elements. It provides call tracing, diagnostics, performance statistics, traffic reports, and browsing of call detail records stored in the CDR manager.

CDR Element (CDRE)

The CDRE is responsible for the ControlSwitch System billing and data analysis functions. It centralizes the billing data formatting and transport functions. The CDRE is responsible for generating one single billing record for one call.

Events Collector (EC)

The EC collects and stores billing and call-related events from the various ControlSwitch System elements for subsequent processing of reports and CDRs.

Event Relay Server (ERS)

The ERS enables the ControlSwitch System to integrate with the third-party Operational Support Systems (OSS) such as event monitoring applications and fraud management systems in a deployed ControlSwitch System network. It relays events in real time to the clients in an open and standard XML format for ease of integration with the customized event processing and monitoring applications.

Policy Element (PE)

The PE delivers unmatched flexibility, with policies that can be based on one hundred and sixty routable parameters. It responds to service policy queries with treatments based on a database of provisioned policies. It supports a growing variety of service policies including routing, screening, announcement, IN service triggers, QoS, registration, and authentication. Its customized policy creation and provisioning are GUI-based and a real-time in-memory hierarchical database enables an extremely high throughput.

Quality of Service (QoS) Server

The QoS Server provides a mechanism for feedback-based reporting and routing to assure service and guarantee SLAs. It monitors pre-established concurrent calls and imposes limitations based on Trunk Groups, Prefixes, Customer Interaction Center (CIC), and Telephone and Networking Services (TNS). In addition, it provides Answer-Seizure Ratio/Average Call Duration (ASR/ACD) based routing and reporting.

Directory Service Engine (DSE)

The DSE provides support for directory lookups and number translations natively via an optimized large directory query solution. For large directory applications such as Local Number Portability (LNP) or carrier ENUM, the DSE can scale up to 400 million entries.

Legal Intercept Data Access Point (LIDAP)

The LIDAP performs legal interception provisioning functionality. It communicates with a mediation device for the assignment of target information into a database and replies to queries from the Service Execution Element (SEE) to determine whether the call will be tagged for interception or not.

Service Execution Element (SEE)

The SEE allows for the rapid delivery of enhanced user services. Because it operates as a protocol-agnostic engine, the SEE enables service creation, regardless of the underlying framework. The SEE executes the service logic within the ControlSwitch System and can serve as a service broker when coordination is required across multiple external application platforms. Flexible adapters enable SEE services to combine resources residing in ControlSwitch System elements as well as external application systems such as Intelligent Network (IN) systems and SIP-based application servers. Rapid services creation, deployment, and activation are enabled via XML scripting. SEE is based on the Services Logic Execution Environment (SLEE) and is developed in C++. Some of the services provided are announcements, postpaid, account codes, toll free, collect call, IVR services, and IN services.

Application Server (AS)

Value-added services can be implemented easily and quickly via third-party application servers or natively via the ControlSwitch System SEE. Value-added services (such as calling cards [prepaid/postpaid/travel], conferencing, call center, messaging, VoIP VPN, account codes, premium number with IVR, call block, collect call) are in-service today on the ControlSwitch System.

Call Control Element (CCE)

The CCE supports protocol-specific call control and protocol mediation between PSTN facing (SS7/C7, ISDN-PRI, CAS) and generic call processing protocols and resource management (Trunk Gateways [TGs], channels, Gateways [GWs]) using MGCP/H.248.

Interconnect Border Control Function (IBCF)

The IBCF enables global carrier IP peering, protects the carrier network against malicious attacks, and provides key security features including topology hiding, access control lists for “denial of service” attack prevention, and far-end and near-end Network Address Translation (NAT) traversal to avoid NAT/firewall complications.

IP Call Element (ICE)

The ICE supports SIP and H.323 protocol-specific processing, protocol mediation between VoIP protocols (SIP and H.323), ControlSwitch System generic call processing protocols, resource management (IP Trunk Groups, IP Gateways, Gatekeepers), and SIP-I and SIP-T protocols.

Distributed Signaling Gateway (DSG)

The DSG, built on the Dialogic® I-Gate® 4000 EDGE Media Gateway, allows the ControlSwitch System to connect to the SSP, STP, and SCP resources of the SS7/C7 network for PSTN call signaling and for intelligent networking services.

SIGTRAN Signaling Element (SSE)

The SSE supports MTP level 3 User Adaptation (M3UA) that is defined within the SIGTRAN protocol suite. It uses the Stream Control Transport Protocol (SCTP) and Internet Protocol (IP) as its underlying transport, enables service providers to take advantage of the IP transport network, and offers additional features.

Technical Specifications

Features

Service Policies

Highly flexible, policy-based routing engine

- Rapid development and deployment of customized policies
- Multi-tiered routing (no limit on number of tiers)
- Multiple numbering plans (no limit): international, national, and private
- Advanced call screening
- Re-routing/route advance
- Virtual Private Networks (VPN) support
- Combination of TDM and IP routes

160 routing/screening parameters

- Signaling attributes
- System attributes (for example, trunk group parameters)
- Dynamic attributes (for example, Time of Day, ASR)

Other Service Policies

- Announcements, account codes, personal pin, security pin, triggers, and authentication

Security

Provides security and NAT functions for signaling and media planes

Offers defenses against Denial of Service (DoS) and other IP layer attacks

Supports H.323 and SIP peering traffic

Network-wide scalability

Resides in the network core or in distributed Points of Presence (POP) as per service provider needs

Advanced provisioning and enforcement of security policies

SS7

(IMS/TISPAN equivalence; SGF)

Termination of SS7 MTP, ISUP, TCAP

Telcordia tested

VeriSign certified

Multi-National SS7 support

- Support for ANSI, ITU, ETSI, and dozens of country-specific variants
- Programmable signaling framework (data-driven variant support)

Support for up to 126 A-links/E-Links/F-links per DSG

M3UA

Supports M3UA adaptation layers defined within the SIGTRAN suite of protocols

Uses SCTP and IP as its underlying transport

M3UA configurations available

- MTP level 3 Backhaul: Dialogic® I-Gate® 4000 EDGE Media Gateway terminates MTP and user signaling is backhauled to the ControlSwitch System via IP
- Peering with M3UA-capable STPs; in this mode, the ControlSwitch System peers directly with STPs via IP

Service Level Assurance/QoS

Real-time event/statistics-driven routing and policy enforcement

Programmable concurrent calls limitation and monitoring

- Prefixes, CIC, and TNS parameters

ASR/ACD-based routing

Statistics database and report

Several report types (co-residing with the event relay server process and event collector)

ASR reports

ACD reports

Directory Services

Supports directory lookups and number translations natively

Provides optimized large database-lookup solution for applications such as ANI screening, LNP, and ENUM

Scales up to 400 million entries

Legal Intercept

Provides mediation device with two interfaces

- TDM-based loop via the Third Party Mediation Device for call delivery
- IP-based interface for provisioning of interception targets

Element Management

Unified management of distributed systems

Web-based GUI with local and remote interfaces

End-to-end real time call tracing capabilities for both PSTN and VoIP signaling

Dynamic modification to parameters during operation

Circuit-switch COT test support

Configuration and provisioning of all ControlSwitch System elements, SS7 network parameters, trunk groups, media gateway parameters, routing policies, and dial plans

Fault management

ControlSwitch System alarm management, media gateway alarm management, network element monitoring, and SS7 monitoring and audit reports

Open northbound interfaces for management system support

PL-SQL API and SNMP

Security

- Privilege levels and security for users
- Creation and deletion of user groups
- Login/logoff tracking

Channel management at DSO level

ISUP, CAS, and PRI trunks resource management

CDRs browsing

Performance management:

- Periodic monitoring
- Scheduled reports generation
- Wide range of Call Setup and Trunk Usage reports

CDR Generation and Searching

FTP transport, text-based CDR with over 160 parameters, BAF format, Flexible CDR Query

Generates text-based CDRs for billing mediation systems

Raw call events for billing and traffic analysis

- Configurable persistent storage for call event data
- Generates Bellcore AMA Format (BAF) CDRs
- Coexistence with Open Settlement Protocol Clearinghouse

Event Collection and Relay

Collects and stores billing and call-related events and QoS statistics

In conjunction with the Policy Element, automates network-wide, real-time feedback and corrective action to maintain custom SLAs

SLAs established per customer, per interconnection partner, per service, plus others

Filters and relays events to the clients in an open and standard format for

- Easing the integration with the customized event processing
- Monitoring and fraud management applications

Protocol Support

MGCP

H.248 v1 and H248 v2

ANSI/ITU/ETSI ISUP and a number of country variants

AIN/INAP/MAP

ISDN Q.931 (PRI): NI-2 and ETSI

Back-up D channel support

Q.931 non-facility associated signaling (NFAS)

SIP (RFC 3261 and others)

H.323 V1-V4

SIGTRAN — SCTP, M3UA and IUA

Digital CAS support (E&M, R1.5, R2)

CAS MF and DTMF signaling support

CAS wink start, immediate start, and delay dial

SNMP

OSP

Recommended Platform

NEBS Level 3 compliant Sun Netra platforms running Sun Solaris operating system

Software runs on other Sun platforms running Sun Solaris operating system

Approval Compliances ITU

ANSI

ETSI

Telcordia

IETF

TISPAN

IMS

MSF

Installation and Configuration

Software pre-loaded and preconfigured on the system

Supports software upgrades

Scalability and Performance

Scales to five million Busy Hour Call Attempts (BHCA) across multiple media gateways on a Sun platform

Distributed, modular architecture provides scalability through addition of Sun platforms

Fault Tolerance and Reliability

Automatic failover of any ControlSwitch System element to active backups distributed on one or more machines

Auto-diagnostic and recovery mechanisms for hardware, software, signaling link, or network fault

SCTP — Protocol for messaging between ControlSwitch System elements and network level redundancy

Events collector and CDR Manager disk mirroring

High availability

Geographic redundancy

Routing database replication

CPU overload protection

SS7 link redundancy

Approvals, Compliance, and Warranty

Hazardous substances

Country-specific approvals

Warranty

RoHS compliance information at www.dialogic.com/rohs

Contact your local Dialogic sales representative

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The logo for Network Fuel, featuring the words "NETWORK FUEL" in a bold, sans-serif font. The word "NETWORK" is in white on a black background, and "FUEL" is in black on a white background. A registered trademark symbol (®) is located to the right of the word "FUEL". The logo is set against a background of a complex network diagram with nodes and connecting lines.

NETWORK FUEL®