Dialogic® PowerMedia™ XMS

Dialogic’s PowerMedia™ XMS is a powerful next-generation software media server that enables standards-based, real-time multimedia communications solutions for mobile and broadband environments. PowerMedia XMS supports standard media control interfaces such as MSML, VXML, NetAnn, and JSR 309, plus a Dialogic HTTP-based version of a RESTful API.

PowerMedia XMS serves the needs of application developers and network operators, with:

- Cloud-ready, virtualized media processing software
- Production-ready media server interfaces for web and traditional media applications
- A full suite of media application capabilities with WebRTC support
- Comprehensive audio, video, and contact center features

Offloading difficult media handling to PowerMedia XMS’s flexible rich media processing software helps to improve user experience, optimize network efficiency, and reduce development time.

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits</th>
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<tbody>
<tr>
<td>High performance software-only media processing with excellent call rates, high voice quality PESQ scores and low media latency</td>
<td>Supports the development and deployment of demanding service provider applications (such as conferencing, messaging, fax(^1) and IVR services) on common datacenter server infrastructure without the need for specialized hardware</td>
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<tr>
<td>Support for IETF, 3GPP and W3C WebRTC codecs (Opus audio, VP8 video) and technologies to provide real-time video and audio media mixing, security, signaling and NAT/firewall traversal with WebRTC-enabled HTML5 browsers</td>
<td>Facilitates the development and deployment of rich communication apps and services across Web, VoIP/SIP, Mobile and PSTN networks to virtually all connected endpoints</td>
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<tr>
<td>Advanced multimedia processing functionality, including HD Voice and real-time video; video transcoding, transrating and transizing up to HD720p resolution with H.264 and VP8 codecs</td>
<td>Positions solution providers to attract new users and increase target revenue by offering multimedia solutions with a high user Quality of Experience (QoE)</td>
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<td>Virtualization (VMware ESXI 5.x, KVM, Oracle VM, Xenserver) support</td>
<td>Promotes lower CAPEX, and deployment of communications solutions on virtual machines in private and service provider datacenters</td>
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<td>User-friendly OA&amp;M that includes a web-based GUI and HTTP RESTful Management interface for real-time control and monitoring</td>
<td>Helps reduce deployment costs and OPEX by enabling the quick resolution of operational issues</td>
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<td>Simple yet flexible licensing model that allows scaling from ten ports to thousands of ports per server</td>
<td>Can save CAPEX by allowing solutions to be scaled easily by software upgrade as demand grows</td>
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\(^1\) Controlled Introduction in XMS Release 2.4
WebRTC with PowerMedia XMS!

WebRTC harnesses the power of video, voice and data as built-in real-time communication features of HTML5 browsers such as Google Chrome and Mozilla Firefox. Reducing barriers to rich communication services on both client and application sides of the service delivery equation, WebRTC simplifies the integration of interactive video, voice and data communications in a wide range of solutions and on many new dimensions.

PowerMedia XMS energizes application development of WebRTC enabled solutions and services, adding to its ability to provide rich media mixing, any-to-any connectivity, software virtualization and Telco hardened scalability.

PowerMedia XMS is well suited for solution providers seeking to integrate WebRTC into new or current applications. The flexible XMS solution can handle multiple facets of WebRTC technology including audio and video transcoding security, NAT traversal or signaling to integrate with WebRTC endpoints and media streams for deployment in virtually any network environment.

Overview

PowerMedia XMS is a powerful next-generation software media server that enables standards-based, real-time multimedia communications solutions for SIP and WebRTC in mobile and broadband environments. PowerMedia XMS is controlled by the business logic of applications deployed on SIP application servers and web application servers to execute high-density real-time multimedia communication functions. XMS’s media server capabilities include inbound and outbound session/call control, audio/video play and record, transcoding, transrating, transizing of video streams, multimedia conference mixing, content streaming, and a wide range of advanced supporting functions for communication sessions.

Examples of Media Processing applications

PowerMedia XMS can handle an extensive range of real-time media processing needs, including:

- **Multi-party conferencing** – low-latency mixing of audio and video, including HD voice and high-resolution video up to HD 720p, and Multi-point Control Unit (MCU) for group communications with the ability to adapt individual streams to optimize the experience for each user
- **Transcoding** – any-to-any audio and video codec conversion for a wide-range of fixed, wireless, and web-oriented codecs, including transcoding and transizing for video
- **Media interworking** – conversion of underlying transport protocols and encryption interworking, including support for a WebRTC Media Gateway
- **Recording** – local audio and video recording or interfacing with third party recording systems
- **Stream processing** – analyze, insert, and modify the audio or video stream, including for speech recognition, DTMF, video overlays, and much more
- **Person-to-Machine** – connect to computer-controlled interfaces, not just other people, for applications such as Interactive Voice (and Video) Response (IVR and IVVR) systems, and speech interaction, or potential use cases such as biometrics, among others.
PowerMedia XMS for Developers

Developers can leverage PowerMedia XMS’s programmable APIs to rapidly add sophisticated media handling capabilities to their applications. By offloading difficult media handling requirements to PowerMedia XMS’s specialized software, developers are able to focus on unique aspects of their application without having to become media processing experts. PowerMedia XMS supports web-oriented APIs, a standardized Java interface, and media server scripting languages for easy development with powerful media controls.

<table>
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<tr>
<th>Supported Media Control APIs</th>
<th>Benefits</th>
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<tbody>
<tr>
<td>RESTful control interface for multimedia processing and call control via HTTP messages</td>
<td>Simplifies development for web application programmers who do not have in-depth familiarity with traditional telecommunications interfaces</td>
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<tr>
<td>MSML (RFC 5707) interface for multimedia control protocol support</td>
<td>Enables the delivery of standards-based solutions in IMS and other SIP-based environments</td>
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<tr>
<td>JSR 309 connector software, compliant with the Java Community Process specification for a protocol-agnostic media server control API</td>
<td>Allows development of real-time multimedia applications and services on standard Java Platform, Enterprise Edition (Java EE) converged (SIP and HTTP) application servers, leveraging application redundancy and high availability capabilities of Java EE servers</td>
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<tr>
<td>NetAnn (RFC 4240) and VoiceXML v2.0/2.1 (with VXML 3.0 for video) control interfaces</td>
<td>Provides standards-based control interfaces for announcements, IVR, IVVR, and speech enabled applications</td>
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PowerMedia XMS for Network Operators

Service Providers and Network Operators can quickly plug PowerMedia XMS into their existing networks using its standardized media control interfaces. PowerMedia XMS is software-based and supports widely used hypervisors for easy integration into virtualized cloud environments. PowerMedia XMS is deployed in a variety of environments, including service providers, enterprises, and contact centers.

PowerMedia XMS for WebRTC

WebRTC is revolutionizing communications by providing a powerful and large open source community-based technology for embedding communications in web browsers and mobile applications. PowerMedia XMS includes support for WebRTC audio, video, and media plane technologies, allowing developers and network operators to extend their applications and services to the web. PowerMedia XMS’s web-oriented APIs and virtualized software are well suited for dynamic, cloud-based environments where WebRTC is typically deployed alongside other web services.

PowerMedia XMS WebRTC Media Gateway

A common WebRTC application is to extend existing SIP-based systems to communicate anywhere over the web. PowerMedia XMS can act as a WebRTC Media Gateway to mediate WebRTC media-plane differences from those of typical existing VoIP networks including encryption interworking, transcoding, and client-based NAT traversal support. PowerMedia XMS has been integrated with a variety of application servers and signaling gateways with HTTP-to-SIP (H2S) functionality and rapidly integrates with others using its web API or standard interfaces.

PowerMedia XMS Media Resource Function (MRF)

Many large-scale telco networks are designed to follow the guidelines and definitions of network functions and interfaces set forth by the 3GPP IMS architectural specifications. PowerMedia XMS is conformant with 3GPP-specified media interfaces and supports the IMS profiles for voice services defined by the GSMA for Long Term Evolution (LTE) networks. This allows XMS to be deployed as a Media Resource Function (MRF) providing key media processing capabilities that may be required by IMS-based services such as VoLTE and RCS. Additionally the conformance to IMS specifications promotes compatibility between legacy telephony networks and evolving IP telecommunication standards.

See our IMS migration page for more information on Dialogic’s MRF and IMS portfolio.
Transcoding Gateway

New codecs are being introduced into the network faster than older ones are being retired. PowerMedia XMS can act as a transcoding gateway, providing interworking of a wide variety of audio and video codecs. PowerMedia XMS’s software nature also means that new codec support can be rapidly added without changing physical DSPs or necessitating complicated firmware upgrades. PowerMedia XMS’s virtualization support also allows for flexible and cost effective cloud-oriented network models.

Product Architecture

PowerMedia XMS supports a number of standards-based media control interfaces and management capabilities. This provides customers with a wide range of corresponding SIP, web or converged deployment options utilizing commercial, open source or independently developed application servers. Applications paired with PowerMedia XMS can scale efficiently on common datacenter infrastructure with high availability to meet accelerating subscriber demand. As a software-based IP communications product built on a robust, feature-rich, and award-winning host media processing engine, PowerMedia XMS can help reduce development and operational costs via flexible development and runtime licensing options. The simple, flexible, and scalable licensing model of PowerMedia XMS lets customers pay only for the functionality they need when they need it, and with the capability for future expansion.

Figure 1 illustrates the wide variety of PowerMedia XMS interfaces and functions, and the real-time multimedia communications solutions XMS can enable in different deployment environments.
Solution Example

Video Conferencing

Figure 2 illustrates an example of a video conferencing solution with PowerMedia XMS for business or social interaction. Users can call into the video conferencing solution from a variety of SIP endpoints, WebRTC enabled HTML5 browsers such as Google Chrome or Mozilla Firefox, or smart devices running SIP softphone clients, including smartphones, tablets, SIP desktop phones, laptop and workstations. Dialogic’s patented and patent-pending video technologies in areas such as video error concealment, rate control, and dynamic bitrate adaptation provide users with improved video quality under various bandwidth constraints and to many different video endpoint types. Additionally, with Dialogic’s patent-pending video encoder sharing technology, PowerMedia XMS reduces the compute resources needed for intensive video operations, providing greater scale and performance in applications such as video conferencing or video stream mixing over traditional MCU implementations. A solution built with PowerMedia XMS can also be used to record video conferences or stream internet-based multimedia content into a conference from an external RTSP streaming server.

Figure 2. Video Conferencing Solution with SIP and WebRTC Endpoints

Deployment Environments

PowerMedia XMS can be deployed on premise, in private and public datacenters, and in service provider networks, allowing deployment flexibility for enterprise and service provider solutions. Support for VMWare KVM, Xen Server and Oracle VM virtualization means that XMS can be installed on a virtual machine image and is ready for application control within distributed cloud environments. The control interfaces offered with XMS provide developers with the following choices of deployment environments.

Traditional VoIP / IMS and Voice over LTE (VoLTE) Network Deployments

In the IMS network, PowerMedia XMS functions as the Media Resource Function (MRF). A SIP Application Server (AS) controls XMS using the MSML control interface (RFC 5707) to enable deployment as an IP media server or IMS MRF.

Additionally, SIP developers can choose to use the NetAnn interface (RFC 4240) to provide basic network media services over SIP, such as network announcements, basic conferences, or VXML dialogs. The PowerMedia XMS VoiceXML 2.0/2.1 compliant interface can be used to interpret VXML scripts and create voice-enabled applications that utilize MRCP-enabled speech servers for Automatic Speech Recognition (ASR) and Text to Speech (TTS) capabilities. In these examples, PowerMedia XMS can also handle SIP calls with WebRTC media, DTLS-SRTP security, and NAT traversal via ICE that originate from WebRTC-enabled browsers.
Java EE Converged Application Server Deployments

A converged application server handles both web applications (HTTP) and SIP services using SIP Servlets (JSR 289). An application deployed on a Java EE Converged Application Server can use the JSR 309 connector software for PowerMedia XMS (licensed from Dialogic) to enable XMS as an external media server resource. Dialogic’s JSR 309 connector software enables a Java EE Converged Application Server access to the real-time communications capabilities of PowerMedia XMS through JSR 309 compliant API calls. The Dialogic JSR 309 connector software also supports multimedia applications with WebRTC media.

Next-Generation IP and Web 2.0 Deployments

A web application written in an appropriate language (Python, JavaScript, etc.) can control XMS using the HTTP RESTful interface. Developers can use call-processing functionality built into XMS or use a third-party call control model where an application server handles SIP or WebRTC signaling. The XMS RESTful API offers web-centric HTTP control of media services for WebRTC applications.

Figure 3 shows an example of a typical deployment of PowerMedia XMS in a Java EE environment. This type of solution can be used for delivering media-rich services such as IVR, conferencing and announcements, as well as in call center applications. In the depicted environment, the Java EE server capabilities can be leveraged to provide application redundancy and high availability for enterprise or service provider applications. Java EE Application Servers and media resources may be geographically distributed, allowing remote access for operation and management.

Figure 3. Dialogic® PowerMedia™ XMS in a Java EE Converged Application Server Deployment Example

Operations, Administration, and Maintenance

PowerMedia XMS provides powerful and user-friendly OA&M functionality, and generally can be installed and configured for initial use in 30 minutes or less. In order to reduce operational costs when deploying solutions, XMS can be managed remotely through a web-based operator console and an HTTP RESTful Web management interface. XMS also supports remote real-time monitoring, alarms, logging, and tracing.

Licensing

The simple, flexible, and scalable licensing model of PowerMedia XMS lets customers pay only for the functionality they need when they need it. With XMS, a customer can start with licenses for basic audio services and can later add HD Voice or video capabilities when required by the application. XMS-based solutions can be scaled from ten to thousands of ports by simple software upgrade.
A time-limited trial license is available for evaluation of PowerMedia XMS and can be obtained from a link off the PowerMedia XMS product page (http://www.dialogic.com/en/products/media-server-software/xms.aspx). For more information about development licenses, please contact Dialogic inside sales (insidesales@dialogic.com).

**Performance**

Software media processing deployed on conventional computer server hardware has been shown to be an effective alternative to specialized DSP-based hardware typically found in service provider networks supporting value-added services (VAS) applications. PowerMedia XMS has undergone independent testing by the Tolly Group, which found that PowerMedia XMS “meets the performance requirements necessary to support VAS applications such as IVR, messaging and conferencing for service provider applications.” Moreover, the Tolly Group’s testing concluded that “PowerMedia XMS meets or exceeds criteria in areas of media server density, host CPU and memory utilization, call processing rates, media latency and voice quality as defined by the International Telecommunications Union (ITU) for media latency and the PESQ algorithm for voice quality.” More details from the Tolly Group's testing are available from Dialogic upon request.

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*The Tolly Group independent testing was performed by Tolly Enterprises, LLC on PowerMedia XMS Release 1.1*

### Technical Specifications

#### Session Capacity

Typical media sessions per server (specific per server results will depend on a variety of factors, including but not limited to deployment conditions, configurations and equipment):

- **Audio** — Up to 2000 sessions of G.711 or 1000 sessions with full-duplex (RTP-RTP) transcoding
- **Video** — Up to 450 unidirectional sessions (also includes audio transcoding), depending on system capacity, codec, resolution, and frame rate, etc.

#### Signaling, Protocol and Control Interfaces

**Control Protocols and Specification Compatibility**

- SIP (RFC3261)
- GSMA IR.92 for Voice over LTE (VoLTE)
- GSMA IR.94 for Video over LTE
- 3GPP TS23.228 for IMS (Mr/Mr’ and Cr interfaces)
- WebRTC JavaScript API
- MSRP for multimedia chat and RCS message services
- RTSP client support for streaming multimedia content from RTSP servers
- MRCP v2.0/v1.0 for connection to speech servers for ASR/TTS - see “Third Party MRCP Speech Vendor Capability” below

**Media Protocols**

- IPv4, IPv6, and mixed-mode IPv4/IPv6
- RTP, RTCP, RTCP-XR, RTCP-HR
- DTLS-SRTP
- ICE Lite, Trickle ICE
- HTTP
Remote Application Interfaces
- RESTful API - HTTP-based RESTful web services interface for controlling media processing and SIP signaling operations
- MSML (RFC5707) – Media Server Markup Language, an XML-based media control API
- JSR 309 Connector – A Java Community Process Java API software connector to control external servers running PowerMedia XMS
- VXML v2.1/v2.0 – A W3C standard XML interface for specifying interactive voice dialogs for IVR or speech enabled applications.
- NetAnn (RFC4240) – Basic Network Media Services with SIP for announcements, dialogs, and simple conferences

Media and Coders

Audio
- Voice and HD Voice play/record
- Tone generation/detection (DTMF, RFC2833/RFC4733)
- Call progress analysis
- Positive Voice Detection (PVD) and Positive Answering Machine Detection (PAMD)
- Fax Tone Detection

Audio Codecs
- Narrowband codecs: G.711u/a, G.723, G.726, G.729a, G.729b, GSM-FR, GSM-EFR, AMR-NB and iLBC
- Wideband codecs: Opus, G.722 and AMR-WB (G.722.2)
- Voice activity detection, silence suppression, comfort noise generation

Audio Conferencing
- N-way (including HD Voice) audio mixing
- Conference Recording
- Automatic Gain Control (AGC)
- Per party gain/volume control
- Active talker detection
- DTMF clamping
- Coach-pupil (whisper) mode
- Loudest N-party mixing
- Privileged party mixing
- Echo cancellation

Video
- Play/record
- Video transcoding, transrating, and transizing
- Video overlays (text and image overlay with scrolling)
Video Codecs
- H.264 Baseline Profile, up to Level 3.1 (HD720p)
- VP8, up to HD720p
- MPEG 4 Simple Profile, up to Level 4 (VGA)
- H.263, H.263++, H.263++ Baseline Profile, up to CIF
- Image sizes: HD720p, 4CIF, VGA, CIF, QVGA, QCIF, SQCIF (and custom resolutions)
- Frame rates: Up to 30 FPS
- Bit rates: Up to 2Mbps
- Video Fast Update (VFU): Configurable responses to I-Frame Update requests
- Fully adaptive video jitter buffer
- Packet Loss Concealment (PLC)
- Dynamic Bitrate Adaptive Encoding
- RTCP feedback support (TMMBR, FIR, PLI, REMB, Generic NACK)

Media Handling
- File operations: HTTP1.1, HTTPS, and/or NFS; RTSP/RTP
- Audio File Containers: .wav, .pcm, .vox, .aud, .amr, .amb
- WAV/PCM Codec Formats:
  - 8k lin PCM, 11k lin PCM, 16k lin PCM, 8k alaw PCM, 8k mulaw PCM
- AMR Codec Formats (RFC 4867):
  - AMR-NB(.amr) and AMR-WB(.amb)
- Multimedia File Formats: .3gp, [.mp4, .mkv], Dialogic .vid/.aud
  - 3GP Container Codec Formats:
    - Video: H.264, MPEG4, H.263
    - Audio: AMR-NB, AMR-WB
  - MP4 Container Codec Formats:
    - Video: H.264
    - Audio: AMR-NB, AMR-WB
  - MKV Container Codec Formats:
    - Video: VP8
    - Audio: OPUS

Fax
- Fax Tone Detection & Notification
- Fax Send and Receive:
  - G.711 or T.38 (Up to v.17)
  - RFC 6913 – Indicating Fax with SIP
  - TIFF and PDF file formats

Language Support
- Variable content announcement / language phrasing:
  - “date”, “digits”, “duration”, “month”, “money”, “number”, “silence”, “time”, “weekday”
- Customizable to support virtually any language or dialect
- Built-in voice files: US English, Mandarin Chinese, Spanish
Virtualization
- VMWare ESXi 5.x
- Kernel-based Virtual Machine (KVM)
- Oracle VM
- XEN Virtual Machine

System Management
- Web GUI
- Real-time monitoring and management via HTTP RESTful control interface
- Command Line Interface (CLI) Scripting
- Remotely managed tracing and logging
- SNMP v2c/v3 for management and traps
- Call Detail Records (CDR)^1
- Audit Logging

Hardware Support and Minimum System Requirements
- Hardware: Intel Architecture-based server
- Operating System (64-bit OS):
  - CentOS Release 6.4 ISO installation OR
  - RedHat Enterprise Linux 6.4
  - Oracle Enterprise Linux 6.4
- Processor: Intel Dual 56xx or greater
- Ethernet: Single or Dual 1000Base-TX (RJ-45)
- Memory: 8 GB RAM minimum
- Storage: 120 GB HD minimum

Third Party MRCP Speech Vendor Compatibility^*
- Lumenvox (ASR and TTS)
- Nuance (ASR and TTS)
- Vestec (ASR)

^ For a current list of compatible speech vendors, and other third party interoperability and compatibility information, visit: http://www.dialogic.com/en/interoperability/powermedia.aspx

^1 Controlled Introduction in XMS Release 2.4