



Kinesis Unified Communications Server: Clustering and Fault Tolerance Capabilities



This paper provides an overview of the Kinesis server architecture, configurations, and connectivity, and discusses how these contribute to its unique clustering and fault tolerance capabilities.

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Introduction

Active Voice has a long history of providing Personal Computer (PC)-based automated attendant/voice processing systems. From introducing our first system on an 8086 processor in 1983, through the Intel® Pentium® server-based unified messaging systems shipping today, Active Voice has maintained a focus on using PC platforms and open software standards.

Today's unified messaging platforms extend communication server architecture initially developed in the late 1990s. The Kinesis unified communications server is built on a foundation of enterprise operating systems and applications developed by Microsoft®. Taking advantage of open standards such as MAPI, IMAP, ADSI, and LDAP provide core functionality today, while allowing us to prepare for the features of tomorrow.

This paper provides an overview of the Kinesis server architecture, configurations, and connectivity, and discusses how these contribute to its unique clustering and fault tolerance capabilities.

Benefits of "True Unified" Messaging

One Message Store. The Kinesis server keeps all voice, fax, and e-mail messages in one store eliminates the need for message store synchronization and the accompanying possibilities of delays or discrepancy.

Streamlined Administration. The Kinesis server leverages the Microsoft Exchange® infrastructure and directory, simplifying administration and maintenance.

Modular Architecture. The Kinesis server is modular, and uses open architecture and industry standard Application Programming Interfaces (APIs). This allows for rapid inclusion of new features and technology.

Architecture Overview

Kinesis is designed to take advantage of the client-server environment developed for PC and LAN-based distributed computing. Using common software packages, APIs and standard hardware provides the Kinesis system with flexible development options for ongoing enhancement.

Platform. The Kinesis server uses a standard PC platform running the Microsoft Windows® 2000 Server operating system. Using a PC platform allows Active Voice to take advantage of technology advances such as increased memory, faster processors and larger storage capacity.

The Windows 2000 operating system provides a strong multitasking environment, a high level of reliability and scalability. Additional supporting features include remote access, file replication, and administration tools. Windows 2000 Server's replication ability allows sites to install "clusters" of Kinesis systems, providing redundancy and greater port capacity than could be accomplished on a single server.

Message Store. The Kinesis server uses the information store in Exchange for voice message storage. Voice messages are stored with e-mail and fax messages, and are handled by Exchange in much the same way. For example, voice messages are transferred over the network between Exchange servers and to desktop clients. The Kinesis server uses the Exchange Message Transfer Agent (MTA) to route messages between servers, and uses a proprietary streaming processes to reduce network traffic when playing messages to subscribers.

SQL Database. Settings for subscribers, call handlers, interview handlers, and other voice mail-specific properties are stored in a SQL database. Using SQL allows Kinesis fast directory searches and improves its scalability. The SQL database replicates with Exchange's Active Directory®.

Supported Protocols and APIs. The Kinesis system supports a variety of different protocols and APIs. Among them are:

- R4 and TAPI for telephony integration
- MAPI for interoperability with Exchange. This also provides plug-in support for SMTP/MIME, POP3 and other messaging protocols.
- LDAP and ADSI for directory services

Configurations Related to Exchange

The Kinesis architecture offers several configurations that allow customers to accomplish different levels of redundancy and scalability, depending on their needs. This paper provides a few examples that demonstrate this flexibility.

Single Server, Voice Mail Only

In this configuration, all hardware and software required for voice processing functionality are contained in one server (**Figure 1**). Subscribers access messages through the telephone conversation. If the server is connected to the LAN, subscribers can manage their settings using the Kinesis web assistant.

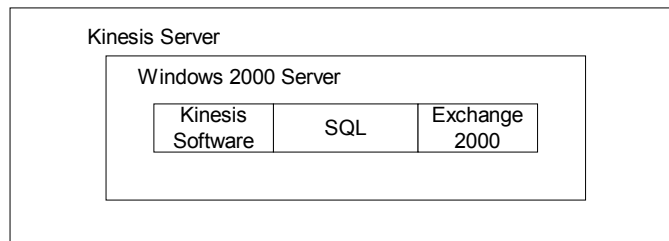


Figure 1

Single Server, Unified Messaging

In this configuration, all hardware and software required for voice and e-mail processing functionality is contained in one server (**Figure 1**). Kinesis is the only Exchange server in the network, and it stores both e-mail and voice mail messages. Subscribers can access messages through the telephone or through their Microsoft Outlook® Inbox.

Multiple Servers, Unified Messaging

The Exchange message store, the SQL database, or both may be stored on servers separate from the Kinesis server. **Figure 2** shows a configuration where the Kinesis Server has Exchange 2000 and SQL installed on the same server as the Kinesis software. **Figure 3** shows another possible configuration, where Exchange 2000 and SQL are located on different physical servers. Other combinations are possible, depending upon the requirements of the site.

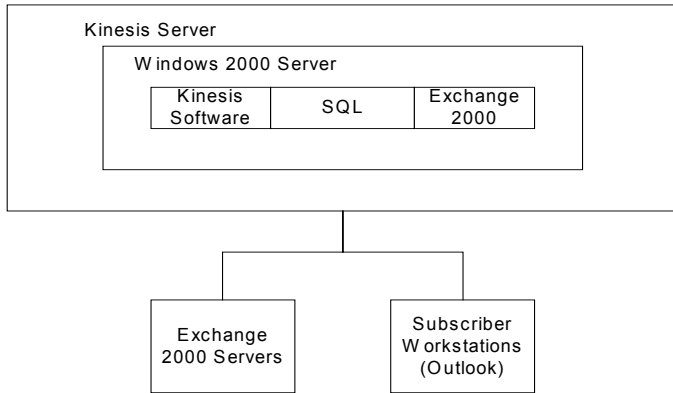


Figure 2

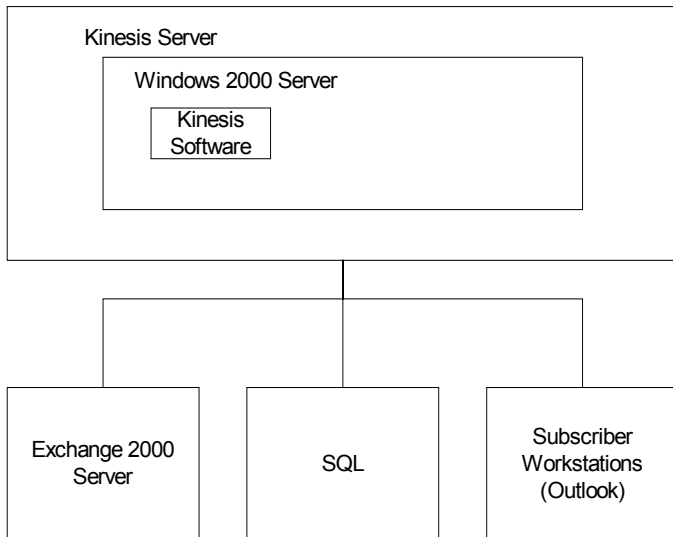


Figure 3

SQL Configuration Options

There are two different configurations available for a one-server voice mail system.

MSDE or SQL Runtime Installed on the Same Machine with the Voice Mail System

The default configuration has MSDE or SQL installed only on the voice mail system. (**Figure 4**).

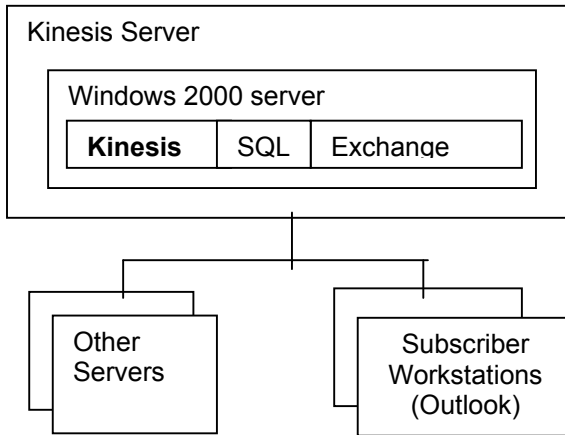


Figure 4

MSDE or SQL Runtime Server Installed on a Different Machine than the Voice Mail System

If the site is very concerned about having a single point of failure, the SQL database can be stored on a separate server. The voice mail system will connect to the SQL server via a high-speed network connection (**Figure 5**). Network connection redundancy is recommended for this configuration. On the complexity scale, the SQL server configuration could start with the MSDE version and can scale to a SQL cluster using Microsoft Clustering Service on the Windows 2000 Advanced Server or Windows 2000 Data Center.

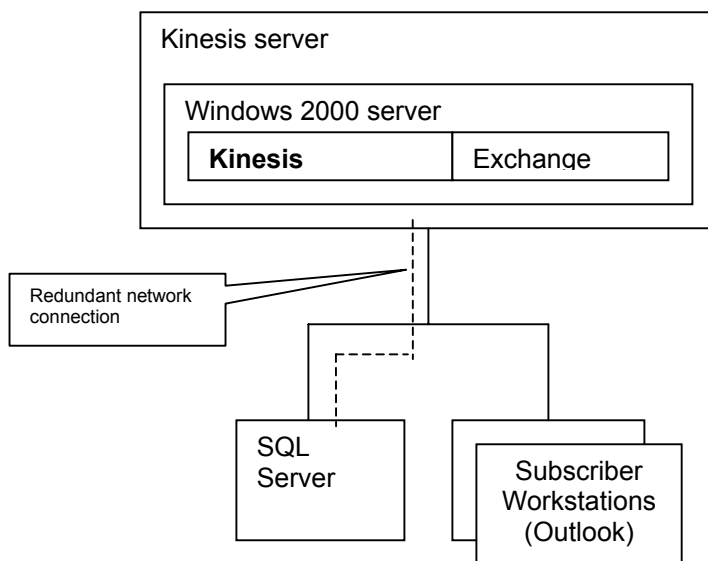


Figure 5

Fail-Over Configurations

Fail-over configurations allow the Kinesis system to continue processing calls and messages, even if one server fails. This requires redundancy in both hardware and software, and the level of redundancy required depends on the site's level of need.

Fail-over configurations rely upon the redundancy of three voice processing system components: the Kinesis application software, the SQL database, and the Exchange 2000 message store. These may reside on the same server, different servers or multiple servers. The following sections detail the redundancy efforts associated with each component.

Fail-over with Exchange 2000

Clustering Exchange 2000 servers provides fail-over capability. This requires the Windows 2000 Clustering Service. If clustering is not in place, a failed Exchange server will make unavailable the mailboxes for subscribers hosted on that server.

Fail-over with SQL

There are two ways to accomplish SQL fail-over for a Kinesis application:

Clustering

Using the Windows 2000 Clustering Service, two or more SQL servers can be clustered. The Kinesis server has access to directory information as long as one server in the cluster is active.

SQL replication

This configuration is specific to the Kinesis application, and requires a SQL database on each Kinesis server. Database replication is configured among the Kinesis servers, allowing the same directory information availability on all Kinesis servers. This configuration also provides an overall performance improvement due to the distribution of the SQL queries among the servers.

Fail-over with Kinesis

True fail-over of the Kinesis server requires the telephone system to actively communicate with Kinesis to determine the status of the Kinesis server. Most telephone systems do not yet provide this level of integration with Kinesis, however, even without that high level of integration, there are two methods, one providing a fail-over support on analog integrations, and the other providing a cold stand-by. Still, both have limitations.

Active/Passive with fail-over

Only the active Kinesis server takes calls, while the passive server acts as a hot standby. A y-splitter is used to send each analog extension assigned to Kinesis to both the active and passive system. The active system is configured to answer calls immediately, the passive system is set for delayed answering (for example, to answer after three rings). If the active system's ports fail to answer, enough ring cycles will elapse to cause the "passive" system to answer.

Limitations: The passive system is idle until the active system ceases call activity. There is a delay in call answering when the passive system is taking calls. This delay may cause some call information, such as ANI or call forwarding packets, to be lost.

Active/Passive standby

This configuration can be used when a digital or serial integrated telephone system is used. Only the active Kinesis server takes calls, while the passive server acts as a standby system. If the active server fails, a system administrator disconnects the telephone connections from that server and attaches them to the passive server.

Limitations: The passive system is idle until manually connected to the telephone system.

Conclusion

The Kinesis unified communications server is built on a foundation of enterprise operating systems and applications developed by Microsoft. Using the Windows 2000 Server operating system, Exchange message store, SQL database, and standard protocols and APIs, provides the Kinesis system with flexible development options for ongoing enhancement. The Kinesis architecture offers several configurations that allow customers to accomplish different levels of redundancy and scalability, depending on their needs. Fail-over configurations allow the Kinesis system to continue processing calls and messages, even if one server fails. Fail-over can be accomplished by using the Windows 2000 Clustering Service to cluster two or more Exchange or SQL servers, replicating the SQL database on each Kinesis server, or by requiring the telephone system to actively communicate with the Kinesis server.

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Glossary

ADSI	Active Directory Services Interface
API	Application Programming Interface
IMAP	Internet Messaging Access Protocol. A format in which an e-mail application gains access to messages on a mail server.
LDAP	Lightweight Directory Access Protocol. A format used to provide access to information in directories.
MAPI	Message Application Programming Interface. The Microsoft specification that allows different messaging and workgroup applications to work through a single client.
MTA	Message Transfer Agent
POP	Post Office Protocol. An Internet format used to retrieve e-mail from a mail server.
SMTP	Simple Mail Transfer Protocol. A format used to send e-mail messages between servers.
TAPI	Telephone Application Programming Interface