Video Access Overview Manual

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Revision history

Revision	Release date	Notes
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Refer to www.nmscommunications.com for product updates and for information about support policies, warranty information, and service offerings.

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1 Introduction

The *Video Access Overview Manual* is one in a set of manuals that describe the Video Access product. It provides a general introduction to Video Access features and concepts. If you are a new user of Video Access, we recommend you start with this manual to get a general understanding of the product. For further information on the components of Video Access introduced in this overview manual, refer to the other manuals in the set.

Video Access documentation set

The following table describes each of the manuals in the Video Access documentation set along with guidelines for their use:

Manual	Description	Guidelines
Video Access Overview Manual	Provides a general introduction to Video Access features.	If you are new to Video Access, we strongly recommend you start with this manual before proceeding to the *Video Mail Application Demonstration Manual.*
Video Mail Application Demonstration Program Manual	Describes a fully functional video mail application built on Video Access and supplied with the product.	Read this manual if you are new to Video Access and prefer to gain some hands-on experience using the technology, and to look at reference code, before you start writing your own applications. Reference code for most of the data structures and API features described in the other Video Access manuals is included in the video mail sample application.
3G-324M Interface Developer's Reference Manual	Describes how to use the 3G-324M Interface to connect with 3G-324M terminals capable of audio and video. It also describes the 3G-324M Interface capabilities and functions.	If you are developing gateway functionality based on the 3G-324M Interface, review this manual serially or in parallel with the *Video Messaging Server Interface Developer's Reference Manual*, depending on the type of application you plan to develop.
Video Messaging Server Interface Developer's Reference Manual	Describes how to play and record audio and video RTP media and how to use the Video Messaging Server Interface.	If your application will use the Video Messaging Server Interface to process video and audio streams, review this manual serially or in parallel with the *3G-324M Interface Developer's Reference Manual*, depending on the type of application you plan to develop.
Video Access Utilities Manual	Describes Video Access utilities available for manipulating 3GP files and monitoring 3G-324M calls.	Use this manual as a reference if you are responsible for Video Access content capture and analysis, and for the manipulation or troubleshooting of data generated or received by Video Access components. The utilities documented here can also be used for the manipulation of content created outside of Video Access.

Note: For an additional layer of detail about Video Access structures, refer to the Video Access header files.

2 Overview

Video Access overview

The Video Access toolkit enables customers to develop and deploy carrier grade applications for video communication solutions. Video Access has a modular architecture, allowing applications to use the components either independently or in conjunction with each other. You can use Video Access to build a broad range of applications, including network systems such as video gateways and enhanced services platforms that support video applications.

Note: You must obtain a software license to enable Video Access. Refer to the *readme_va.txt* file for information on obtaining and deploying a Video Access license.

Video Access components

The following table describes each of the main components of the Video Access architecture. For more information about any component, refer to the corresponding manual indicated in this table.

Component	Description	Related documentation
3G-324M Interface	Provides a flexible API to bridge 3G-324M clients into an IPv4 or IPv6 network for access to various enhanced services and applications.	*3G-324M Interface Developer's Reference Manual*
Video Messaging Server Interface	Controls play, record, and storage (in 3GP file format) for audio and video data to and from an IPv4 or IPv6 network.	*Video Messaging Server Interface Developer's Reference Manual*
Video Access utilities	Describes three utilities provided with Video Access that enable you to manipulate 3GP files and record and extract data.	*Video Access Utilities Manual*
Video Transcoder	The Video Transcoder is a software product that provides simplex or full-duplex transcoding between H.263 and MPEG-4 video streams. Although it is not part of Video Access, it is fully interoperable with the toolkit. The Video Transcoder is discussed in Video Access manuals to provide a broader perspective of NMS video products and, in particular, the relationship of the Video Transcoder to Video Access. The Video Transcoder is available separately from NMS.	*Video Transcoder Developer's Reference Manual*

Component	Description	Related documentation
Video mail sample application	For demonstration and reference purposes, Video Access includes a video mail demonstration application (*vmsamp*). The application can demonstrate many of the toolkit's capabilities, including the following: • Receiving a call from a 3G terminal to the 3G-324M Interface or place a call to a 3G terminal. • Recording audio and video into a 3GP file using the Video Messaging Server Interface. • Playing 3GP files to the 3G terminal. • Tromboning two 3G-324M terminals together. *vmsamp* provides a coding reference that illustrates the use of Video Access APIs beyond what is discussed in the Video Access manuals.	*Video Mail Application Demonstration Program Manual*

Video Access standards

Video Access complies with the following standards:

Standard	Version
3G-324M	3GPP TS 26.110, 26.111, and 26.911 version 6.0.0, 2004
H.223	ITU-T, 2001
H.245	ITU-T, Rev 11, 2005
H.263	ITU-T, 1998
H.264	ITU-T, 2005
H.324	ITU-T, 2005
AMR	3GPP TS 26.090, 26.101, and 26.073, version 5.3.0, 2004
G.723.1	ITU-T, 1996
MPEG-4	ISO/IEC 14496-2, 2004
RTP	RFC 3550 and 3551, 2003
H.263 over RTP	RFC 2190, 1997; RFC 2429, 1998
H.264 over RTP	RFC 3984
DTMF over RTP	RFC 2833, 2000
MPEG-4 over RTP	RFC 3016, 2000
AMR over RTP	RFC 3267, 2002
3GP file format	3GPP TS 26.244, version 6.1.0, 2004
ISO base media file format	ISO/IEC 14496-12, 2004

Related Natural Access concepts

Video Access runs on NMS CG boards in the Natural Access environment. To completely understand Video Access, it is important to have a general understanding of certain Natural Access concepts. This section describes those Natural Access concepts on which Video Access builds. For more information about Natural Access services, refer to the Natural Access manuals on the NMS web site.

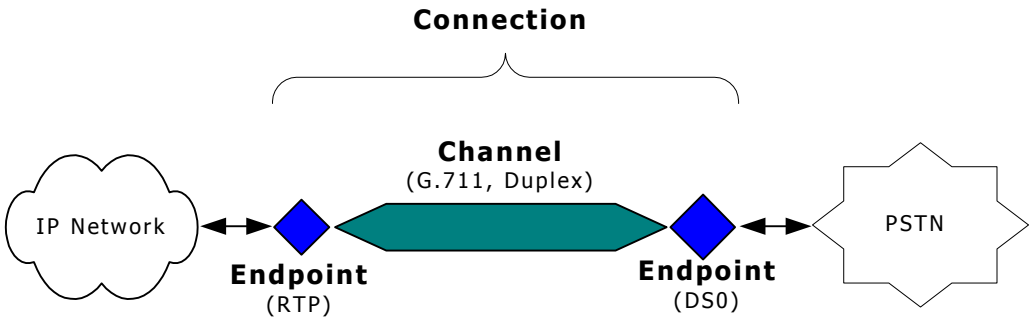
MSPP service

The Natural Access Media Stream Protocol Processing (MSPP) service provides functions for creating media channels between endpoints established at different ends of a Fusion gateway. The MSPP service creates and controls audio and video RTP endpoints.

Applications use the MSPP service to create and control the following components:

Component	Description
Endpoints	Entry and exit points for data that passes through MSPP channels.
Channels	Linked sets of functions that transform a real-time flow of media from one network format to another. Channels can either carry data in two directions (duplex) or one direction (simplex).
Connections	One-way or two-way data streams through the gateway created by associating MSPP endpoints with MSPP channels. When connections are enabled, data flows through the associated channels to the connected endpoints.

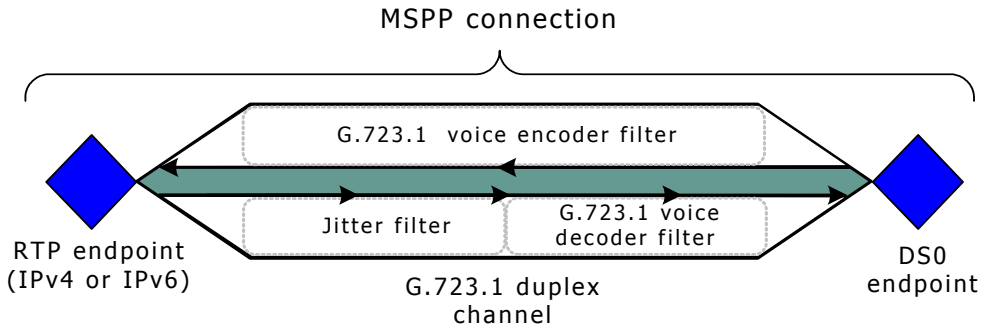
When an application connects an MSPP channel to two MSPP endpoints, it forms a complete MSPP connection. Enabling the connection allows data to flow through the gateway from one network interface to another. The following illustration shows MSPP service connection components:



MSPP endpoints and channels are used in Video Access for both the 3G-324M Interface and the Video Messaging Server Interface. For more information, refer to Creating an endpoint in the *3G-324M Interface Developer's Reference Manual* and Creating endpoints in the *Video Messaging Server Interface Developer's Reference Manual*.

MSPP filters

Each MSPP connection consists of a linked set of MSPP filters. An MSPP filter is a task or process that performs an operation or set of operations with data that flows through it. All MSPP endpoints and channels are made up of one or more filters that perform specific tasks with the data they receive. Cumulatively, these filters carry out all the tasks performed by the endpoints and channels that make up the connection. The following illustration shows the filters that make up a typical voice channel:



MSPP endpoints and channels use filters in the following way:

- Endpoints are made up of a single filter that translates data between a network specific transport format (for example, PSTN/DS0 or UDP/RTP format) and a media-specific format (for example, G.711 voice or H.263 video).
- Channels consist of one or more MSPP filters that perform specific tasks with data as it moves from one endpoint to another (for example, jitter buffering).

Applications can use MSPP service functions to send commands and queries to the filters that make up standard MSPP service endpoints and channels. For more information about MSPP channel and endpoint filters, refer to the *MSPP Service Developer's Reference Manual*.

ADI service

The ADI service is a component of Natural Access that enables applications to execute multiple telephony functions on NMS Communications boards and software, including CG boards. The application accesses multimedia play and record functions through the ADI service. For more information on the ADI service, refer to the *ADI Service Developer's Reference Manual*.

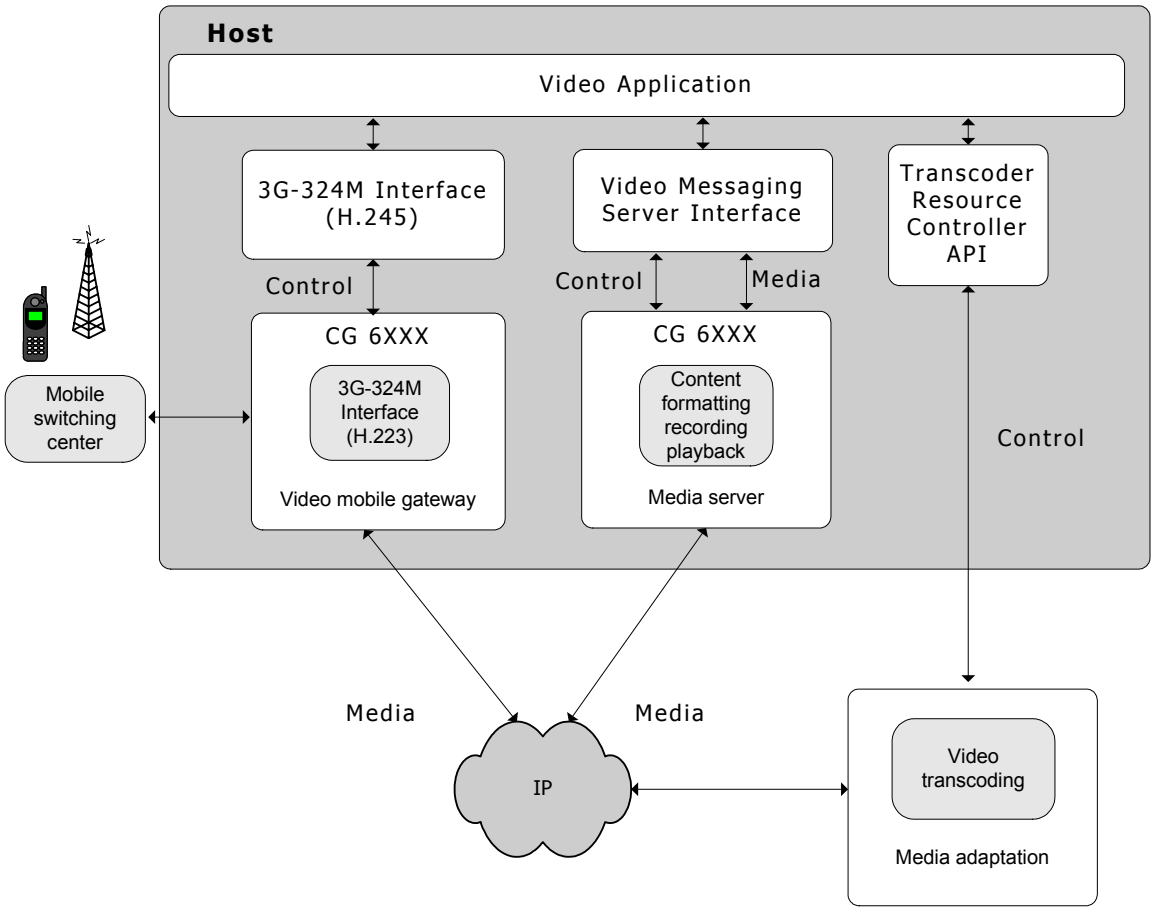
Note: The use of the ADI service for Video Access is limited to the play/record functionality of the Video Messaging Server.

Video Access architecture

Advantages of the flexible and modular characteristics of the Video Access architecture include:

- Application components that use the 3G-324M and Video Messaging Server interfaces can be developed and tested independently.
- The 3G-324M and Video Messaging Server interfaces can use different boards and run on different chassis as long as the application uses a recognized protocol for communicating between sub-systems.
- Developers can implement a variety of system designs within the scope of the flexible framework (for example, using an IP stream media play and record, connected through RTP to the 3G-324M Interface).

The following illustration shows a high-level architecture for supporting the Video Access toolkit (including an optional Video Transcoder) using NMS CG boards:



3G-324M Interface

The 3G-324M Interface allows applications to manage sessions within a 3G-324M network, including call establishment, mid-call control, and call tear down. The middleware that supports the 3G-324M Interface includes H.223 multiplexer/demultiplexer and H.245 signaling stack components.

Video Messaging Server Interface

The Video Messaging Server Interface supports the play and record functions associated with audio and video streams. Applications access multimedia play and record functions through Natural Access ADI service multimedia extensions.

Audio decoding functionality in the recording path allows applications to provide functionality such as automatically terminating record operations based on silence detection. In addition, decoding can provide the first step in transcoding audio data from one encoding format to another (for example, from G.723 to AMR).

The Video Messaging Server Interface also contains a Multimedia File Interface (MMFI) library that enables an application to merge audio and video media streams into a 3GP format file and to split a 3GP format file into two separate media streams.

For information about the multimedia play and record functions and the MMFI Library, refer to the *Video Messaging Server Interface Developer's Reference Manual*.

Video Transcoder

Developers can use the Video Transcoder along with Video Access to perform video transcoding when required by the application. The media streams between the Video Transcoder and the Video Access components or third party devices are transported via RTP.

The video transcoder resource controller (TRC) provides Video Access components with a control interface to the Video Transcoder. A TCP/IP connection between the TRC and the Video Transcoder provides a control channel. The TRC automatically re-establishes any lost connections and reports occurrences such as the loss of connection and connection re-established connections to the controlling Video Access component.

For more information, see the *Video Transcoder Developer's Reference Manual*.

Media flows between the 3G-324M Interface and the Video Messaging Server Interface

Media flows between the 3G-324M Interface and the Video Messaging Server Interface are transported as RTP streams. On both interfaces, control of RTP streams is provided through the Natural Access MSPP service.

To create an RTP endpoint, at least one Ethernet interface of the CG board must be enabled and the destination IP address must be accessible. If both components are located on the same CG board, they communicate through the internal IP stack and do not require external IP connectivity. If the components are located on separate CG boards, the CG board Ethernet ports must either be connected to the same IP subnet, or connected to each other using an Ethernet crossover cable.

3 Video Messaging Server Interface

Video Messaging Server Interface overview

The Video Messaging Server Interface component allows you to:

- Create and control MSPP RTP video and audio endpoints
- Control playing and recording of RTP audio and video streams
- Perform audio transcoding and silence detection (optional)
- Store and read media respectively to and from 3GP format files
- Bridge media from an external source

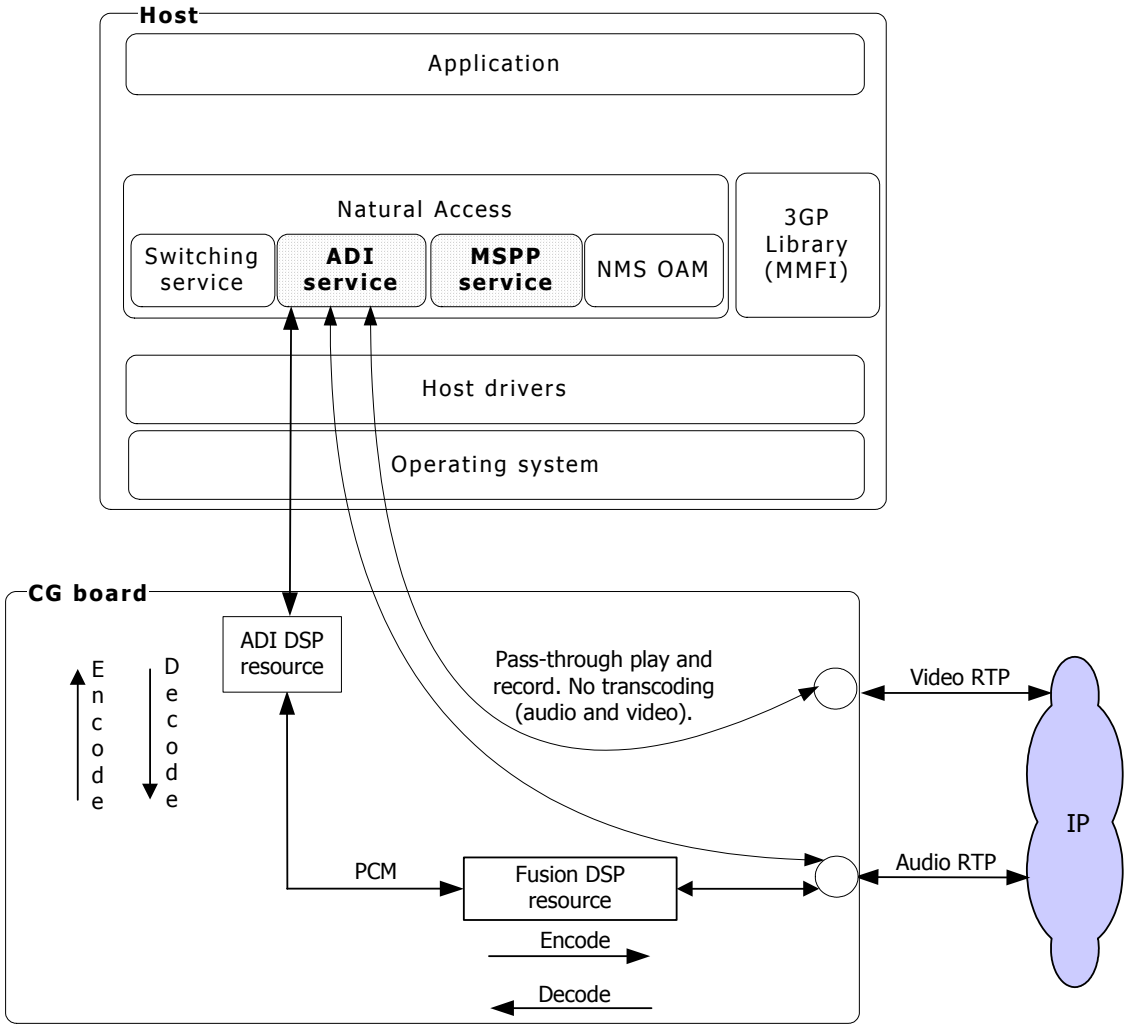
Typically, a video messaging application uses the following Natural Access services and Video Access enhancements:

Service	Description	For more information, refer to...
Natural Access	Creates Natural Access contexts and event queues.	*Natural Access Developer's Reference Manual.*
NMS OAM	Configures and manages the NMS boards.	*NMS OAM System User's Manual.*
MSPP	Creates and controls RTP endpoints and channels on CG boards.	*MSPP Service Developer's Reference Manual* and *Video Messaging Server Interface Developer's Reference Manual*.
ADI	Plays and records audio and video streams through NMS boards.	*ADI Service Developer's Reference Manual* and *Video Messaging Server Interface Developer's Reference Manual*.
Multimedia File Interface library	Stores and reads audio and video streams to and from 3GP format files.	*Video Messaging Server Interface Developer's Reference Manual*.
Switching	Allows simultaneous switching of IVR and Fusion DSPs if audio transcoding or silence detection is required.	*Switching Service Developer's Reference Manual.*

Note: The Video Access Video Messaging Server Interface does not provide an IP signaling component for IP call control.

Video Messaging Interface architecture

The following illustration shows the internal architecture of the Video Messaging Server Interface. The two shaded boxes in the diagram (the ADI service and MSPP service) show the Natural Access features that Video Access uses.



Independent video and audio paths provide applications with a flexible media delivery mechanism between the host and the IP network.

The Video Messaging Server Interface does not directly support video transcoding. Developers can provide this functionality with a separate video transcoding unit, such as the NMS Video Transcoder. However, host applications can configure CG boards to perform audio transcoding during either play or record operations.

4 3G-324M Interface

3G-324M Interface

The 3G-324M Interface provides a flexible API for bridging 3G-324M clients into an IP network to provide access to various enhanced services applications. It allows for simple and flexible call setup with 3G-324M terminals on one side of the interface, while providing control for IPv4 or IPv6 media endpoints on the other side. However, data must enter the interface in 3G-324M format.

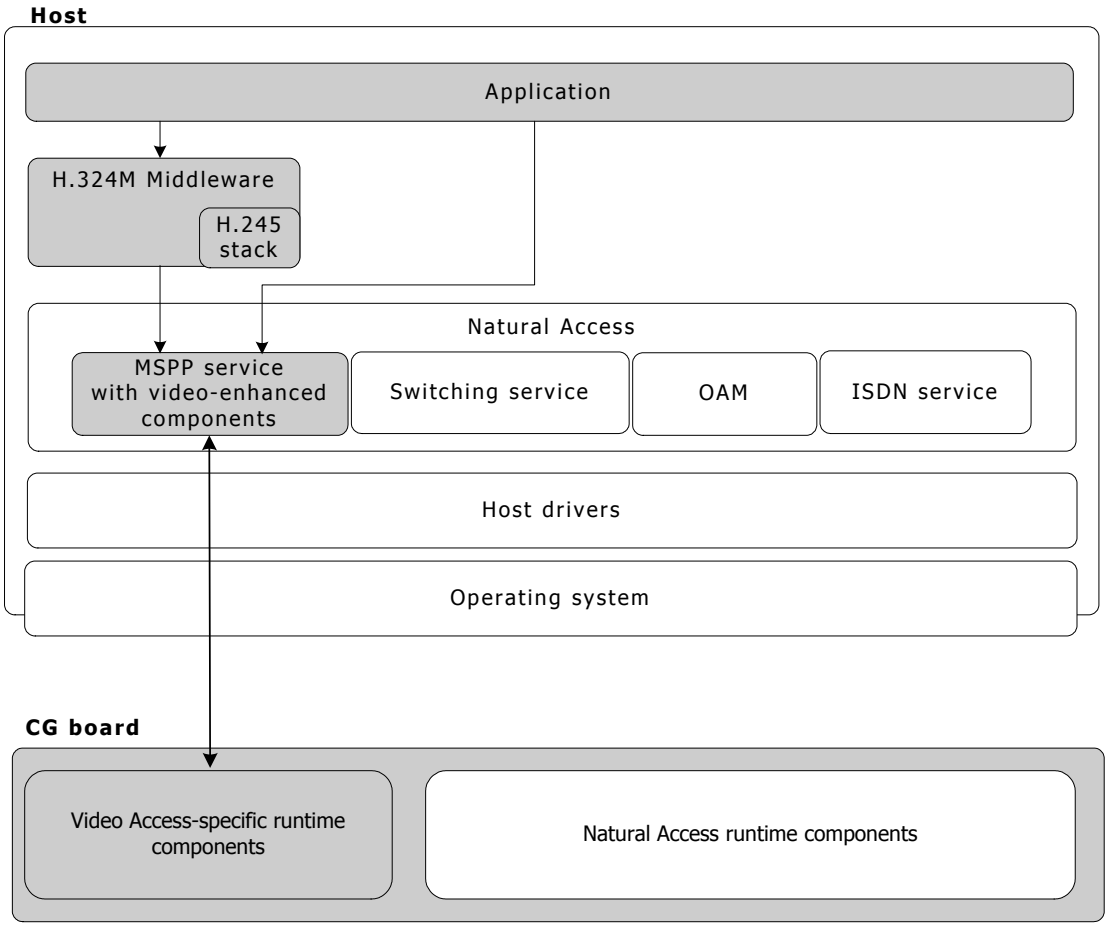
The 3G-324M Interface consists of the following components:

Component	Description
NMS CG board	A board that provides DSP processing resources and network interfaces that can be used by the 3G-324M Interface.
MSPP service functions with video-enhanced components	A set of MSPP functions that create and control media RTP endpoints, H.223 MUX endpoints, and channels for audio and video media connectivity. These video-enhanced functions are available only when you install Video Access and the supporting version of Natural Access.
H.324M Middleware	A set of H.324M functions that provide call session control capabilities, including opening and closing media channels, as well as sending and receiving control messages between the system application and the remote terminals. While this component is used by an application in conjunction with Natural Access, it is not itself, a Natural Access service.
Host application	A user-created application that uses Natural Access functions and H.324M Middleware functions to control call activity.

Developers can use Natural Access to govern non-media specific functions, such as call control signaling, trunk monitoring, OAM, and other functionality that are also performed on the same platform.

Note: An IP signaling component for IP call control is not included in the Video Access 3G-324M Interface.

The following illustration shows the components of the 3G-324M Interface. These components are shaded.



3G-324M Interface data flow

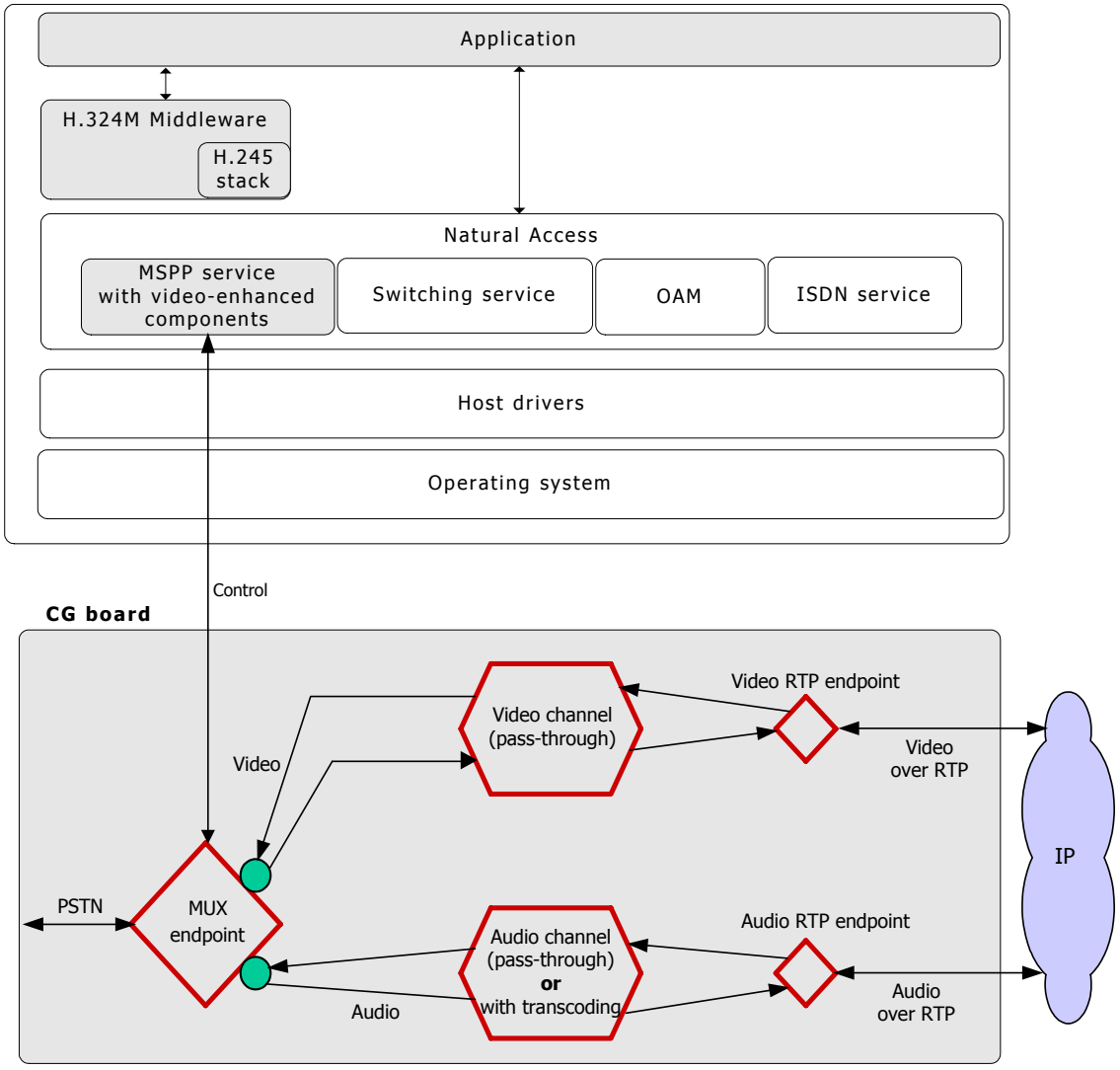
The 3G-324M Interface works as follows for data flowing from a 3G terminal:

- The host application configures the Interface by creating endpoints and channels with the video-enhanced MSPP functions. The host application then manages calls by using the H.324M Middleware.
- On the PSTN side of the Interface, audio and video media streams, as well as H.245 control information, are multiplexed and demultiplexed using H.223 MUX/DEMUX on PSTN channels.
- For incoming calls, the DEMUX in the 3G-324M Interface splits up the incoming data into three streams: control, audio data, and video data.
- The host application receives control messages through H.324M events and sends control messages through H.324M functions.
- On the IP side of the Interface, the audio and video streams are output as two separate RTP streams.

The 3G-324M Interface works in a similar fashion for data flowing from the IP side. The data on the IP side enters the Interface as two separate RTP streams and is output on the PSTN side as a single multiplexed 3G-324M stream.

The video data stream is not transcoded in the 3G-324M Interface, but audio data can be transcoded, if required.

The following illustration shows how data flows through the 3G-324M Interface:

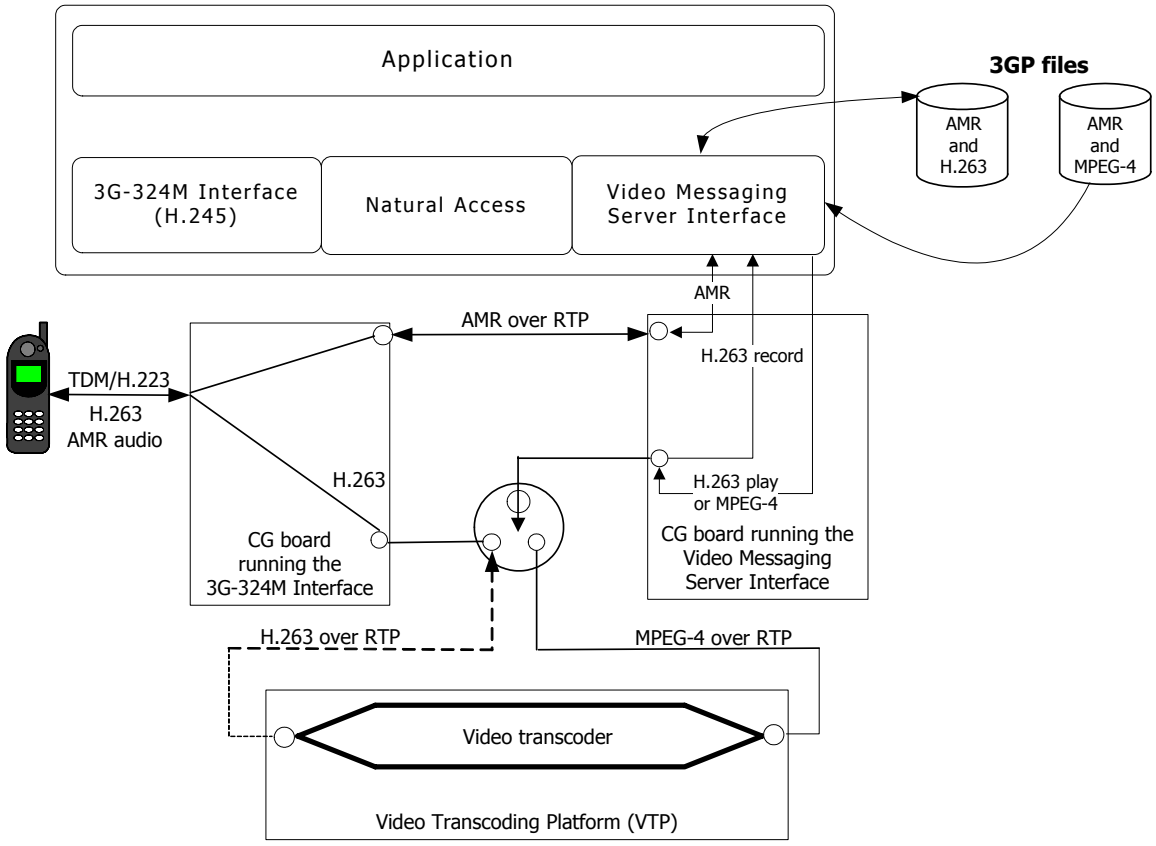


5 Video transcoding

Media flows when using the Video Transcoder

An optional video transcoder controls real-time media adaptation between two IP devices. The Video Transcoder (available as a separate product from NMS) enables video applications to control transcoding channels in the video transcoder platform.

The following illustration shows the media flow in a video mail system for a scenario in which H.263 baseline video is the negotiated format in the 3G-324M connection:



All MPEG-4 video content played to the terminal must go through the Video Transcoder so that it can be processed by the terminal. The Video Messaging Server Interface can transfer H.263 mail messages directly to the 3G-324M Interface.

The application is responsible for correctly configuring RTP endpoint on the server so that the server sends RTP packets from the Video Messaging Server Interface by one of the following messages:

- Through the video transcoder platform, which then relays the packets to the 3G-324M Interface
- Directly to the 3G-324M Interface (internally on the CG board if a single board is used).

For recording operations, H.263 video is transferred via RTP from the 3G-324M Interface to the Video Messaging Server Interface where it is stored in 3GP format.

For more information, refer to the *Video Transcoder Developer's Reference Manual*.

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