



hp-ux networking

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technical
white paper

hp-ux multimedia streaming protocols

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introduction

Digital-video transmission has managed to creep into our lives. It is expected that within the next few years, high-quality video will be distributed along with voice and data, in our offices, and homes.

A multimedia-streaming server helps to achieve controlled streaming of multimedia information over an enterprise network. The streaming server can receive data from various sources, including its own secondary storage. It consists of codecs to transform data, a mechanism to control the flow of data, and a mechanism to deliver this data over the network.

market forecast

Network enterprises find the use of streaming in delivering corporate communications very compelling due to cost savings in applications like on-site training, remote sales presentation, management broadcasts, etcetera.

Steve Balmer of Microsoft says, "There will be a day, I promise you, when every corporation will view it as a routine to communicate with its employees via streaming over the corporate intranet."

In a networking computing e-mail poll, respondents were asked if they were considering using broadcast video.

Following is the result of this poll in percentile:

Answer	Response (in percentage)
Yes, we are currently using it.	25
Yes, within six months.	12
Yes, in 12 to 24 months.	13
Yes, beyond 24 months.	24

The poll results indicate that companies are showing precipitous interest to use video-broadcast, with potential opportunities in streaming products.

Internet Traffic is expected to augment from 1 Million terabytes/month to 16M terabytes/month in the near future.

It is estimated that streaming server market will grow considerably from 64,000 units in 2001 to 212,000 in the next couple of years, approximately 300% increase (from Video Streaming Study by Anderson school at UCLA).

HP offers an optimum framework for multimedia streaming solutions in terms of performance as it has implemented the critical portion of RTP in the kernel. This is HP's key differentiating factor in the multimedia streaming market.

This white paper presents a birds-eye-view of MSP, multimedia streaming protocols, supported on the HP-UX 11i v1 and HP-UX 11i v2 operating systems.

It provides information about the marketing opportunities that multimedia-streaming solutions provide. In addition, the document delineates the technology strategy, HP's offering, software availability, and so forth.

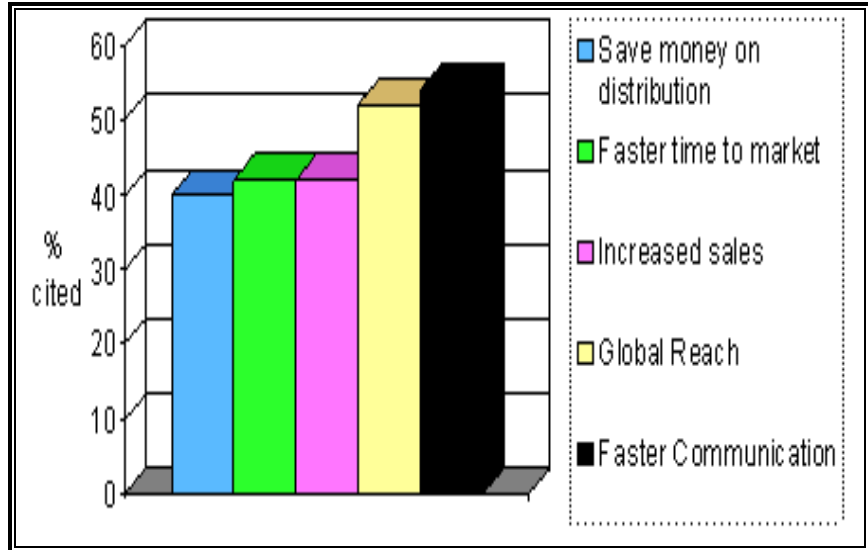
In the subsequent sections, this white paper provides an overview of MSP protocols, scenarios in which it is used, product architecture, etcetera.

executive summary

Problem statement

The need for a multimedia streaming solution, which facilitates faster communication, resulted in the development of MSP. A marketing survey was conducted by HP to analyze how customers might use MSP, and most of the respondents seemed to be concerned with faster modes of transferring multimedia data over remote networks.

The following chart depicts how Fortune 500 executives graded the benefits of streaming video for corporate use:



To achieve significant performance improvement, Real Time Protocol (RTP) and Real Time Control Protocol (RTCP) have been provided in the kernel.

technology strategy

HP sees its MSP solution as being an Internet pervasive computing paradigm. To provide the best MSP framework in the industry, it plans to provide streaming accelerator, which analyzes the RTSP messages exchanged between the user-space streaming server and the client.

Msp description

Multimedia Streaming Protocols (MSP) suite of protocols facilitates transfer of audio, video and animation files to a remote location in real time. Streaming multimedia data is a transaction between the server and the client. The client is a user application that accesses the media, such as Real Player or Winamp. The server is an application that provides all the client applications with the multimedia content. Unlike the download and play mechanism, the multimedia streaming client starts playing the media packets as soon as they arrive, without holding back to receive the entire file. While this technology reduces the client's storage requirements and start-up time for the media to be played, it introduces a strict timing relationship between the server and the client.

MSP defines the transaction that is used to establish a connection and transmit the media from the server and client. Multimedia streaming servers use a suite of protocols, such as the following:

- ✓ Real Time Protocol (RTP)
- ✓ Real Time Streaming Protocol (RTSP)
- ✓ Session Description Protocol (SDP)

protocol overview**Real Time Protocol (RTP)**

Real Time Protocol (RTP) is a transport protocol that provides end-to-end network transport functions for applications transmitting data with real-time properties, such as interactive audio and video. These services include payload type identification; sequence numbering; time stamping and delivery monitoring. Applications run RTP on top of UDP.

RTP consists of Real-Time Control Protocol (RTCP), a closely linked protocol, which provides a mechanism for reporting feedback on the transmitted real-time data.

RTP can be used in the following scenarios:

- ✓ Multicast audio conference
- ✓ Audio and video conference
- ✓ Mixers and translators

Real Time Streaming Protocol (RTSP)

Real Time Streaming Protocol (RTSP) controls the transfer of real-time media data and serves as a network-remote-control for multimedia services. The client requests a selected media file from the server using RTSP. The server, in response, returns information required by the client to transfer the media data. Applications, which use HP-UX MSP libraries, run RTSP on top of TCP.

Session Description Protocol (SDP)

Session Description Protocol (SDP) describes the general real-time multimedia sessions. A multimedia client uses SDP to announce a conference session by periodically multicasting an announcement packet to a familiar multicast address and port using Session Announcement Protocol (SAP).

SDP conveys information about media streams in multimedia sessions and allows the recipients of a session description to participate in the session. The primary use of SDP is in an Internetwork, but it is sufficiently general that it can describe multimedia conferences in other network environments.

The MSP framework for HP-UX multimedia streaming servers includes libraries required for implementing the multimedia streaming protocols (RTP, RTSP, and SDP) and transmitting real-time data over remote networks. These libraries use underlying transport mechanisms, such as TCP and UDP, to deliver multimedia-streaming services.

The MSP implementation on HP-UX offers greater benefits in terms of high performance, ability to take advantage of scalability, reliability, and high availability of the HP-UX operating system.

MSP is available as a web release on the HP-UX 11i v1 and HP-UX 11i v2 operating systems.

The following lists the features that the MSP libraries support:

RTP/RTCP

- ✓ Payload identification
- ✓ Sequence numbering

misp on hp-ux**library features**

- ✓ Time stamping
- ✓ Delivery monitoring

RTSP

- ✓ Establishing and terminating an RTSP connection
- ✓ Sending and receiving request and response messages
- ✓ Attaching headers with messages
- ✓ Parsing of messages and headers

SDP

- ✓ Parsing the SDP description.
- ✓ Obtaining the values of different fields.
- ✓ Setting the values of different fields.
- ✓ Creating the SDP description by the values.
- ✓ A header file that will hold the structure declarations for the above requirements.

conformance to RFCs

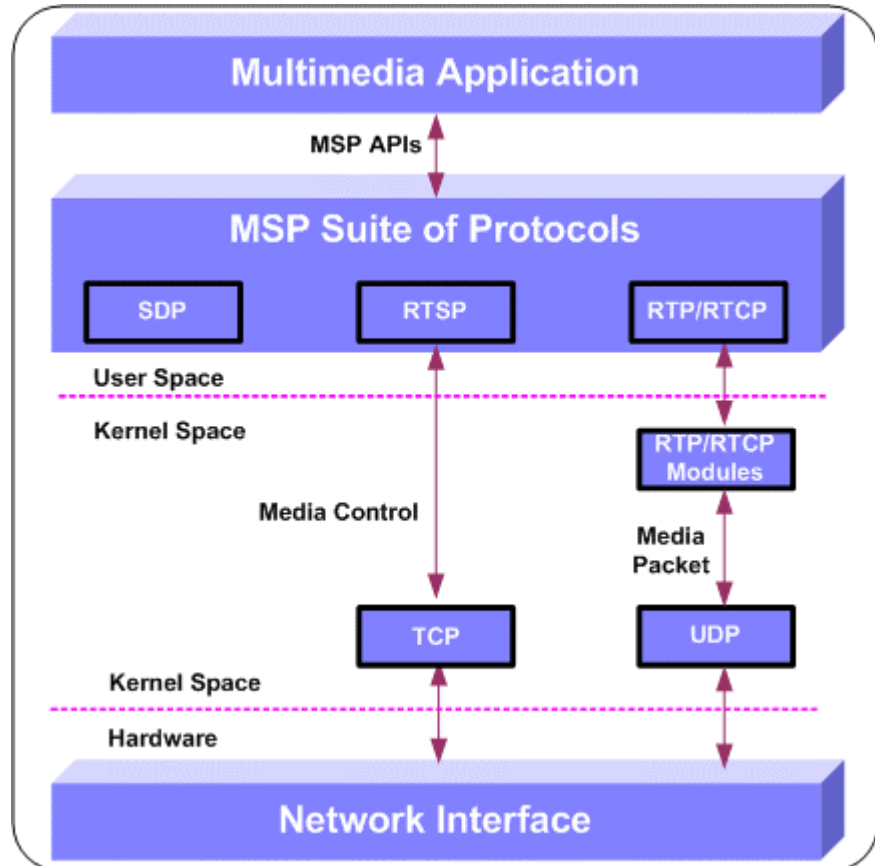
This implementation of MSP on HP-UX 11i v1 and HP-UX 11i v2 conforms to the following Request for Comments (RFCs):

- ✓ RFC 1889 - RTP: A Transport Protocol for Real-Time Applications
- ✓ RFC 2326 - Real Time Streaming Protocol (RTSP)
- ✓ RFC 2327 – SDP: Session Description Protocol

Figure 1 depicts the architecture of the MSP software that is supported on the HP-UX 11i v1 and HP-UX 11i v2 operating systems.

figure 1. MSP architecture

Product architecture

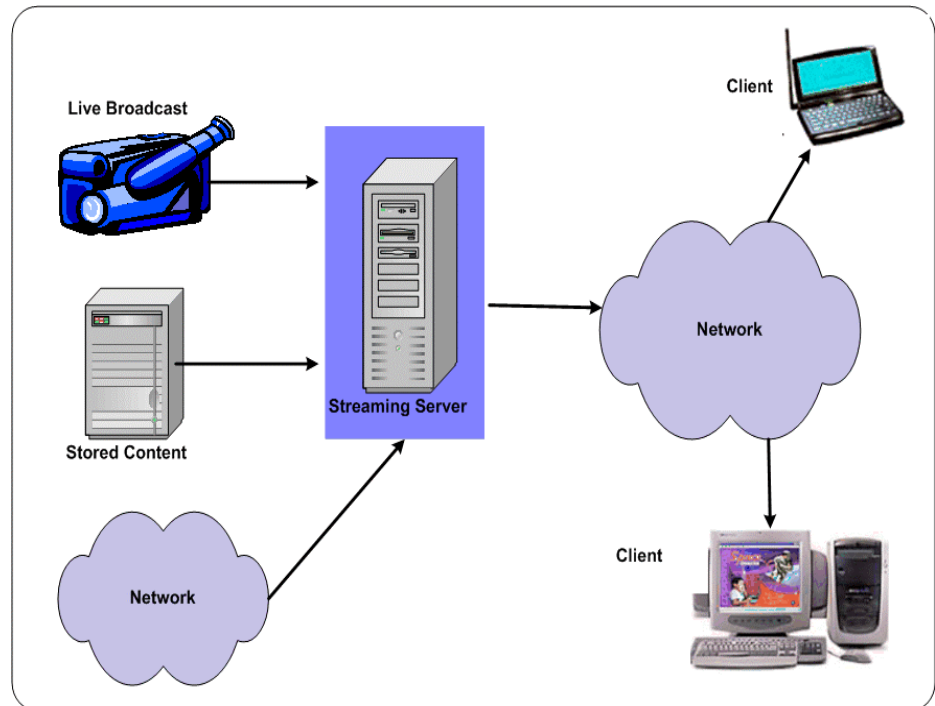


The MSP framework comprises RTSP and SDP modules in the user space and the RTP and RTCP modules in the kernel space. Applications can use the APIs provided in the user space MSP library to access the kernel components, namely, RTP and RTCP.

deployment scenario

The following figure depicts how MSP is deployed in a practical scenario:

figure 2. MSP deployment scenario



The multimedia streaming setup, as shown in figure 2, includes two types of interactions. The multimedia streaming server accepts multimedia data or input from any of the following sources:

- ✓ Live broadcast, such as a digital camera connected to the computer port.
- ✓ Data stored in the form of media
- ✓ Data stored on machines in a network

The streaming server processes the real-time multimedia data and sends it to the client, such as a mobile phone.

compatibility/ interoperability

The following are the system requirements to install and use the MSP software:

- ✓ HP systems running HP-UX 11i v1 or HP-UX 11i v2
- ✓ 1.3 MB of memory

software availability

MSP is available as a web release on the software repository of HP at the following URL:

<http://www.software.hp.com>

glossary

Following is a glossary of terms/acronyms used in this document:

Term	Description
RTP	Real-time Transfer Protocol
RTCP	Real-time Control Protocol.
RTSP	Real-time Streaming Protocol.
SDP	Session Description Protocol.

additional information

For more information about MSP libraries, see the following documents available at <http://www.docs.hp.com/hpux/netcom/index.html>:

- ✓ *HP-UX Multimedia Streaming Protocols Programmer's Guide (5991-0718)*
- ✓ *HP-UX Multimedia Streaming Protocols Release Notes (5991-0719)*