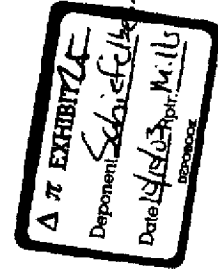


Windows Media Services Hercules Release

Networking

Bill Schiefelbein
Group Program Manager
Digital Media Division
Microsoft Corporation

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.



Plaintiff's Exhibit

7324

Comes V. Microsoft

MS-CC-Bu 000000196209
HIGHLY CONFIDENTIAL

Agenda

- ◆ Top Goals and Scenarios
- ◆ Networking Features
- ◆ What's Implemented Today
- ◆ Q&A

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196210
HIGHLY CONFIDENTIAL

Networking Goals

- ◆ **Enhanced Quality of Service**
- ◆ **Embrace standards**
- ◆ **Improved network management and monitoring of Windows Media**

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

Networking Scenarios

- ◆ **Enhanced Quality of Service**
 - Fast playback startup
 - Single live feed multicast to clients with varying connection rates
 - Ability to provide service level guarantees
- ◆ **Support for standards based protocols**
 - Gain addition proxy/firewall/NAT interoperability through RTSP/RTP protocol usage
 - Enable standards based monitoring applications (WBEM/WMI, SNMP)
- ◆ **Enhanced Distribution**
 - Uni-directional satellite feed
 - Corp broadcast to WAN via service provider (firewall)

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196212
HIGHLY CONFIDENTIAL

Networking Scenarios cont...

- ◆ **Better networking management and information**
 - Real-time feedback on client's reception quality
 - Roll-up of client statistics across server distribution tree
 - Ability to view server networking statistics per-publishing point
 - Centralized network usage management via policy controls over streams
- ◆ **Secure Streaming and real-time DRM**
 - Analyst meeting report to authorized subscribers
 - Live Internet rock concert with controlled ability to record

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

Networking Features

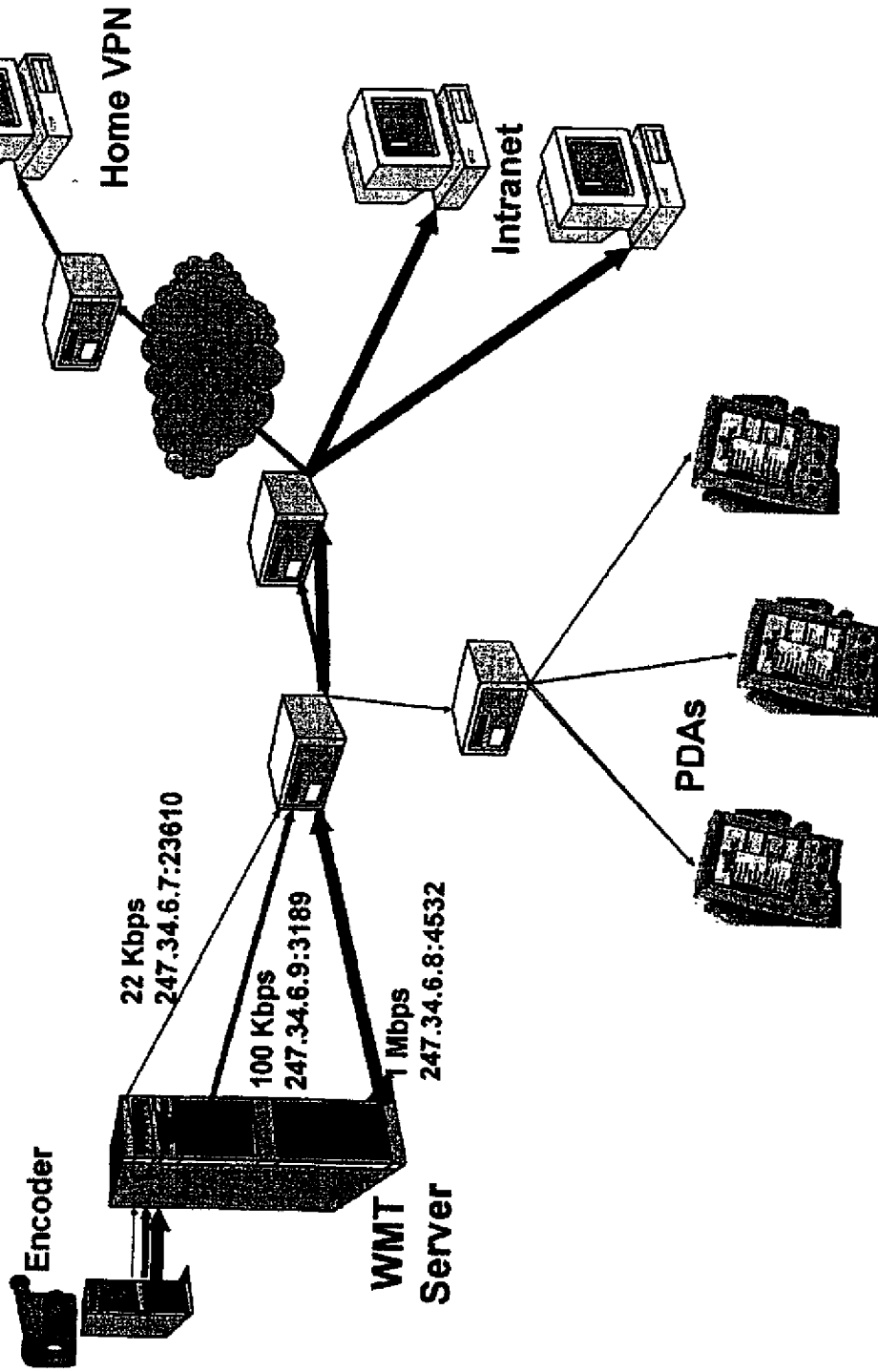
Enhanced Quality of Service

Some of the functionality which enhances the end user's experience includes:

- **Intelligent Streaming**
- **Improved link detection**
- **Multicast MBR**
- **Initial burst for low start-up latency**
- **Progressive download**
- **Selective FEC support**
- **Selective UDP packet size**

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MBR Multicast



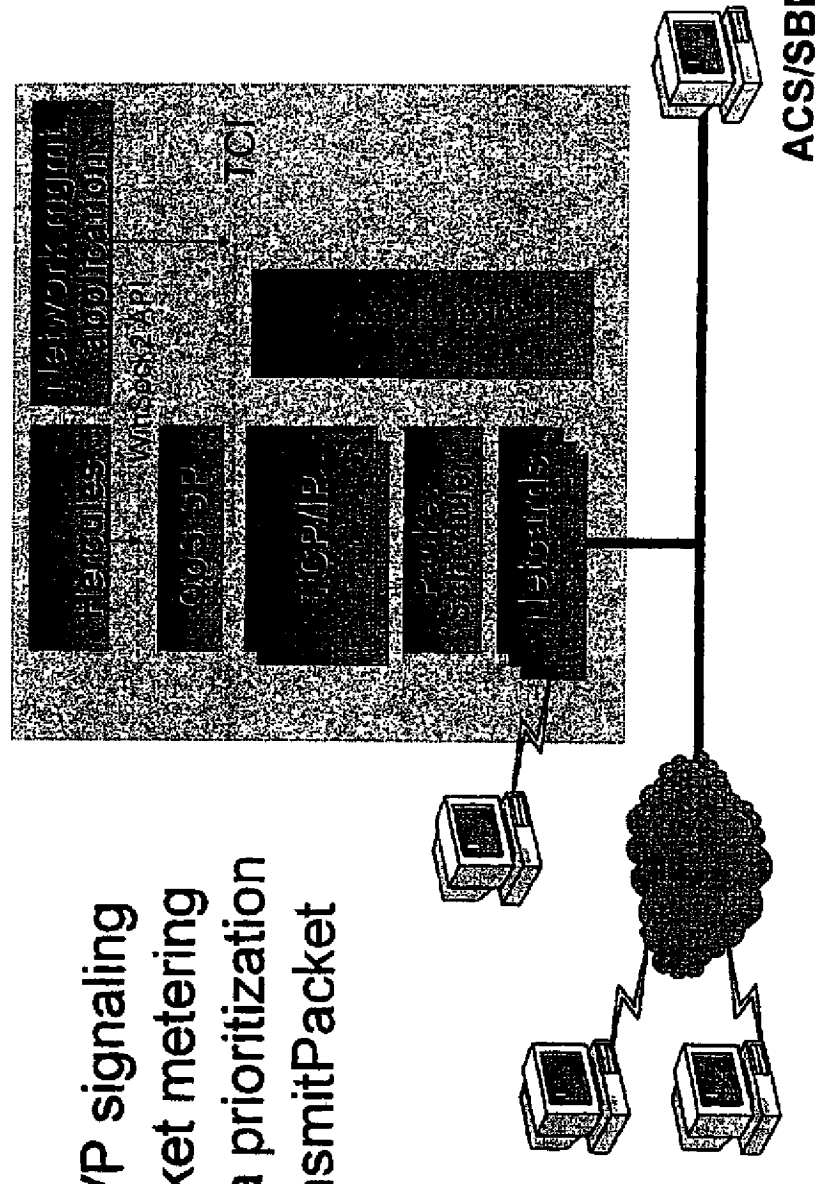
© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196215
HIGHLY CONFIDENTIAL

Networking Features

Enhanced Quality of Service: W2K Integration

- RSVP signaling
- Packet metering
- Data prioritization
- TransmitPacket



© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196216
HIGHLY CONFIDENTIAL

Goals of Intserv/Diffserv

Managing Resource Allocation In The Network

- ◆ Prevent non-adaptive protocols (e.g., UDP) from abusing network resources
- ◆ Partition resources between “best-effort” traffic and higher priority traffic
- ◆ Reserve resources for entitled users/applications
- ◆ Control and prioritize access to resources based on user/application

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196217
HIGHLY CONFIDENTIAL

QoS Mechanisms

- RSVP
- ▼ DiffServ / IntServ
- ▲ Differentiated Services
- ▲ Traffic Control
- ▲ Admission Control / Policy

W2K QoS Integration

QoS Parameters - Service Type

- ◆ **Best effort**
 - Default flow
 - Low priority
- ◆ **Controlled load**
 - Gets service equivalent to lightly loaded network
 - Medium priority
- ◆ **Guaranteed service**
 - Guaranteed delay bounds
 - Highest priority
- ◆ **Qualitative service**
 - Requested by Qualitative applications

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

RSVP

- ◆ Resource reSerVation Protocol
- ◆ Signaling protocol
- ◆ Operates at Layer 3 (IP)
- ◆ Inherent topology awareness

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

RSVP Signaling

- ◆ Unidirectional
- ◆ Soft state. Refresh every 30 sec
- ◆ Signaling messages
 - PATH
 - RESV
- ◆ RSVP signaling messages carry
 - Flowspec - specifies type of service and quantity of resources required
 - Filterspec - specifies the flow that gets the QoS
 - Policy information – who am I, etc

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196221
HIGHLY CONFIDENTIAL

RSVP PATH messages

- ◆ Setup state through the network
- ◆ Carries QoS parameters advertised by the sender
- ◆ Carries policy data
 - User ID
 - Application ID

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196222
HIGHLY CONFIDENTIAL

RSVP RESV Message

- ◆ Retraces same route as PATH
- ◆ Reserves resources in the network
- ◆ Carries QoS parameters requested by the receiver
- ◆ Carries policy objects
 - User ID
 - Application ID

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

802.1p

- ◆ Works at Layer 2 (e.g - Ethernet)
- ◆ 8 traffic classes
- ◆ Traffic class information carried in the layer 2 frame header
 - Token ring and FDDI have defined priority fields
 - Ethernet frames use VLAN tags (802.1q) to carry priority information

© 2003 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

Differentiated Services (Diffserv)

- ◆ Layer 3 (IP) QoS Mechanism
- ◆ Diffserv aggregates traffic into distinct classes.
- ◆ DS field (6 bits) in the IP header carries classification information.
- ◆ Values in the DS field map to a specific per hop forwarding behavior (PHB)

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

Admission Control / Policy

- ◆ **Policy**
 - **Allow Joe in Finance to setup analyst broadcasts between 9am and 5pm**
 - **Mission critical SAP traffic should be given priority at all times.**
- ◆ **Policy Enforcement Points e.g –router, ACS**
- ◆ **Policy Decision Points (Policy server)**
- ◆ **Policy Store (Active Directory)**
- ◆ **Admission control allows / disallows flows based on resources and policy**

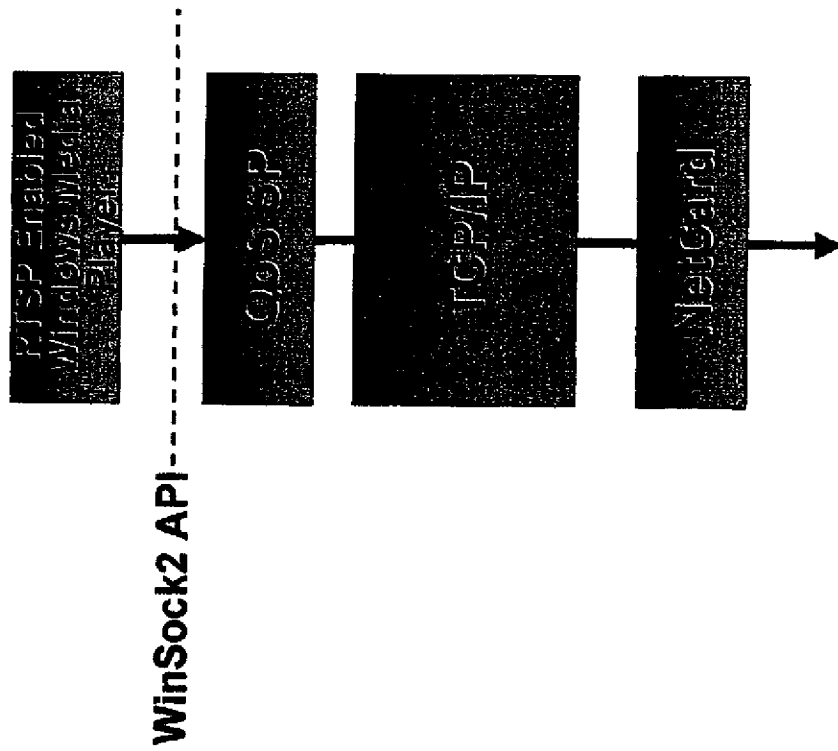
© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

Microsoft Internet Service Terms of Service

- All services are provided on an "as is" basis. Microsoft does not warrant that the services will meet your requirements or that they will be uninterrupted, secure, or available for any specific purpose. Microsoft does not warrant that the services are free of viruses or other harmful components.
- Microsoft reserves the right to modify or discontinue the services at any time without notice, and is not responsible for any consequences arising from the modification or discontinuation of the services.
- Microsoft reserves the right to terminate the services if you violate the terms of service.
- Microsoft reserves the right to suspend the services if you are in breach of the terms of service.
- Microsoft reserves the right to change the terms of service at any time without notice.

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

RSVP Example



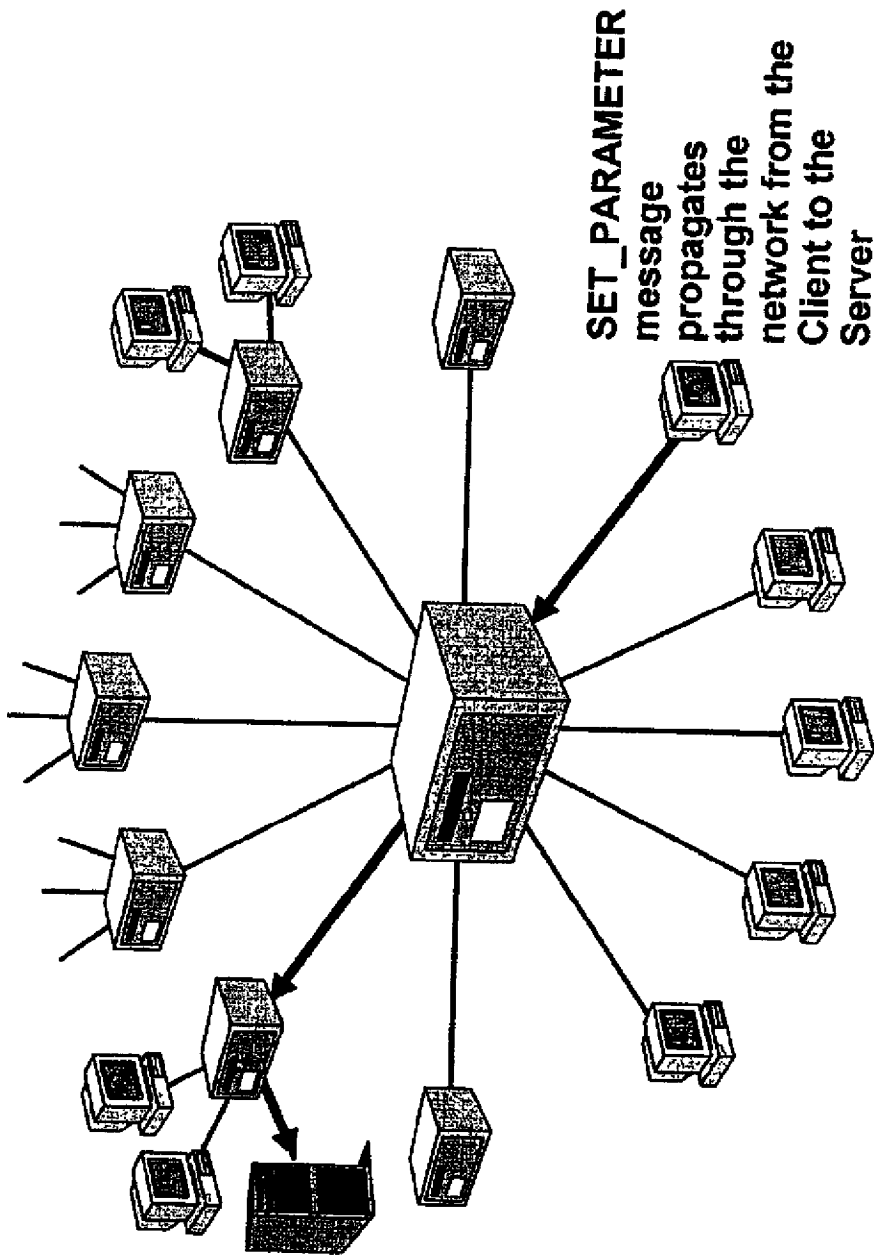
1. Client Application indicates that it is interested in streaming using RTSP

2. Following the SETUP request, it sends an RTSP SET_PARAMETER message to the Windows Media Server indicating it is QoS enabled

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196228
HIGHLY CONFIDENTIAL

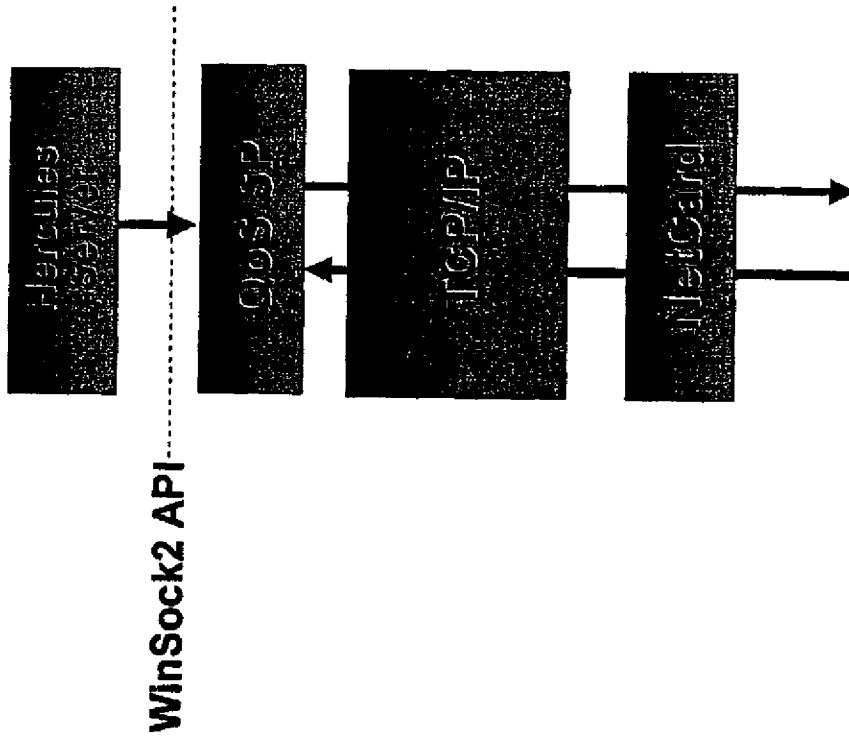
RSVP Example cont....



© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196229
HIGHLY CONFIDENTIAL

RSVP Example cont...



2. Server checks if administrator has enabled QoS on the publishing point

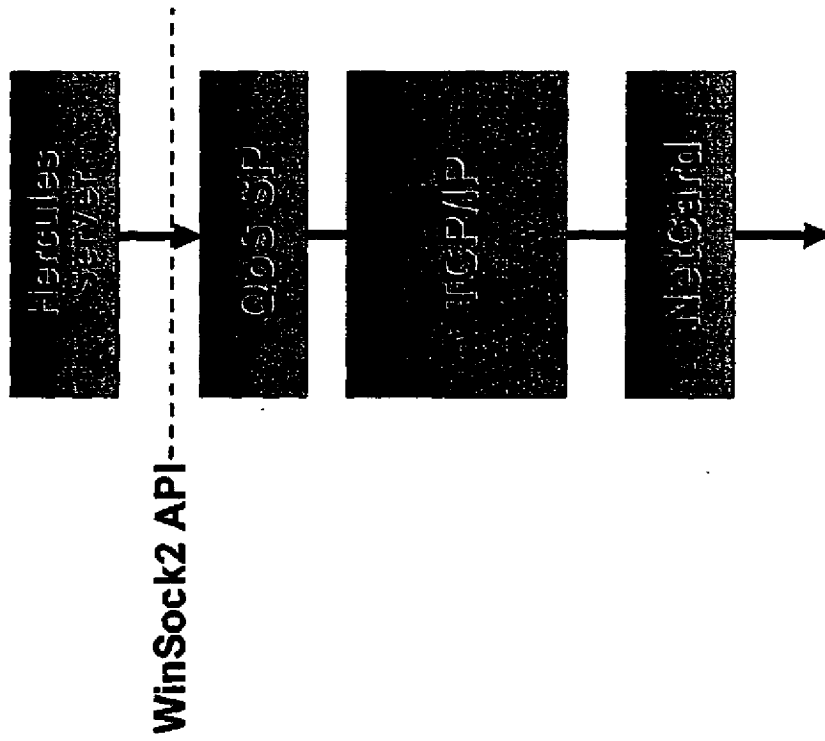
1. SET_PARAMETER message arrives at the Server

3. Server Sends a Reply message with a QoS enabled true indicator to the client

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196230
HIGHLY CONFIDENTIAL

RSVP Example cont...

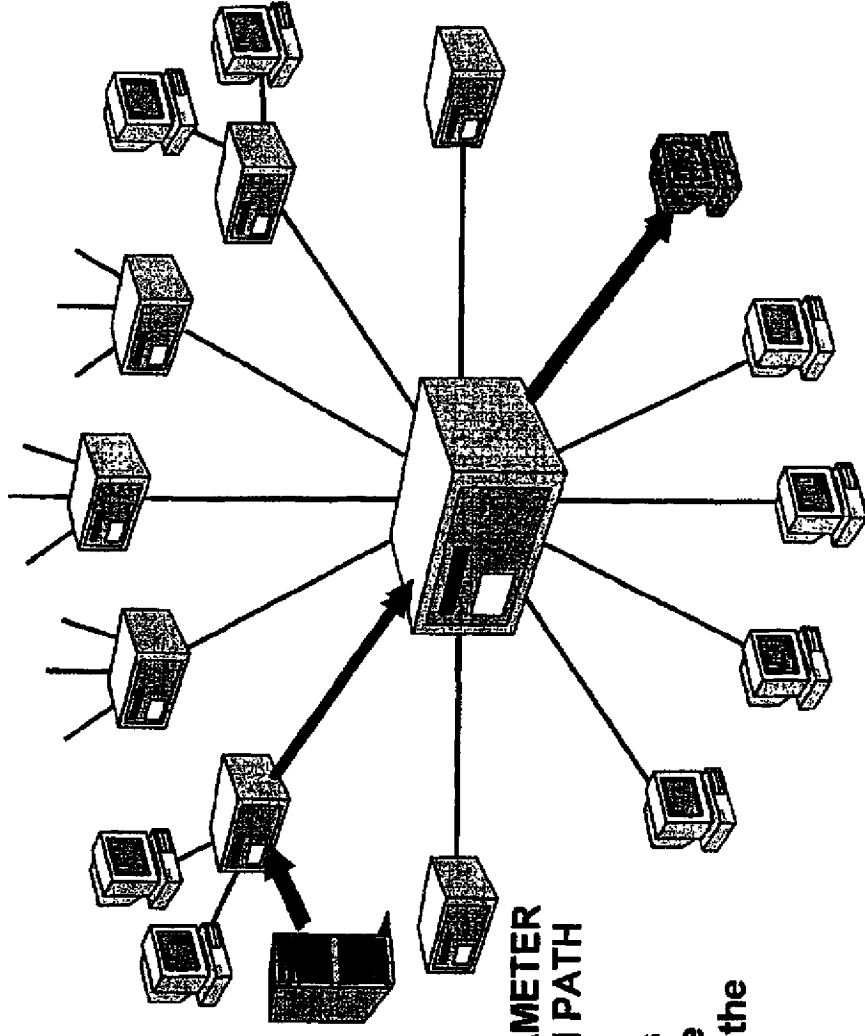


1. Based on the requested streams, the server issues the flow information via GQoS API
2. QoS service provider sends RSVP PATH message to network

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196231
HIGHLY CONFIDENTIAL

RSVP Example cont...

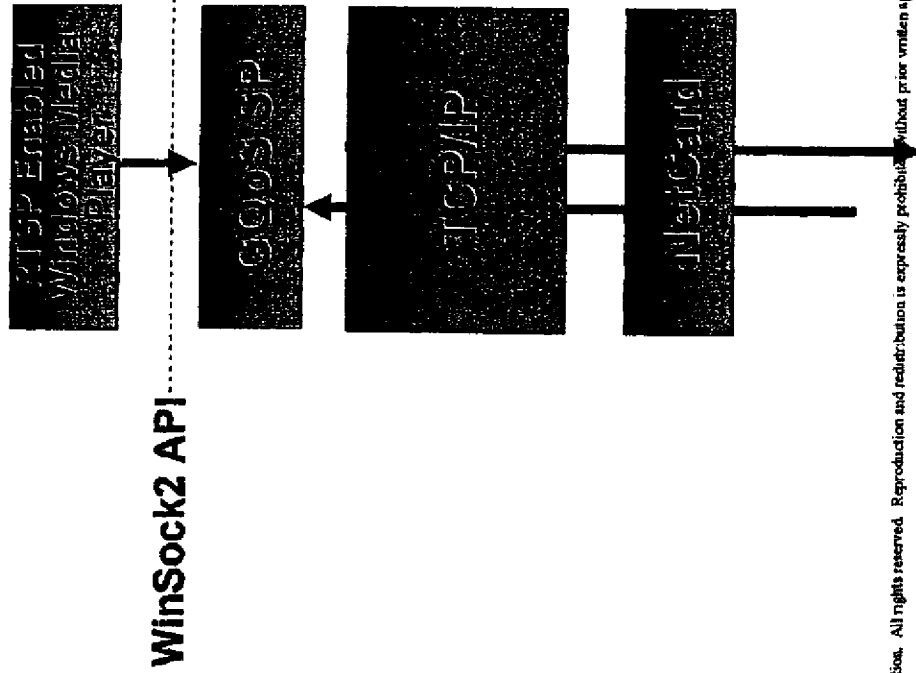


**SET_PARAMETER
REPLY and PATH
message
propagates
through the
network to the
client**

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196232
HIGHLY CONFIDENTIAL

RSVP Example cont...



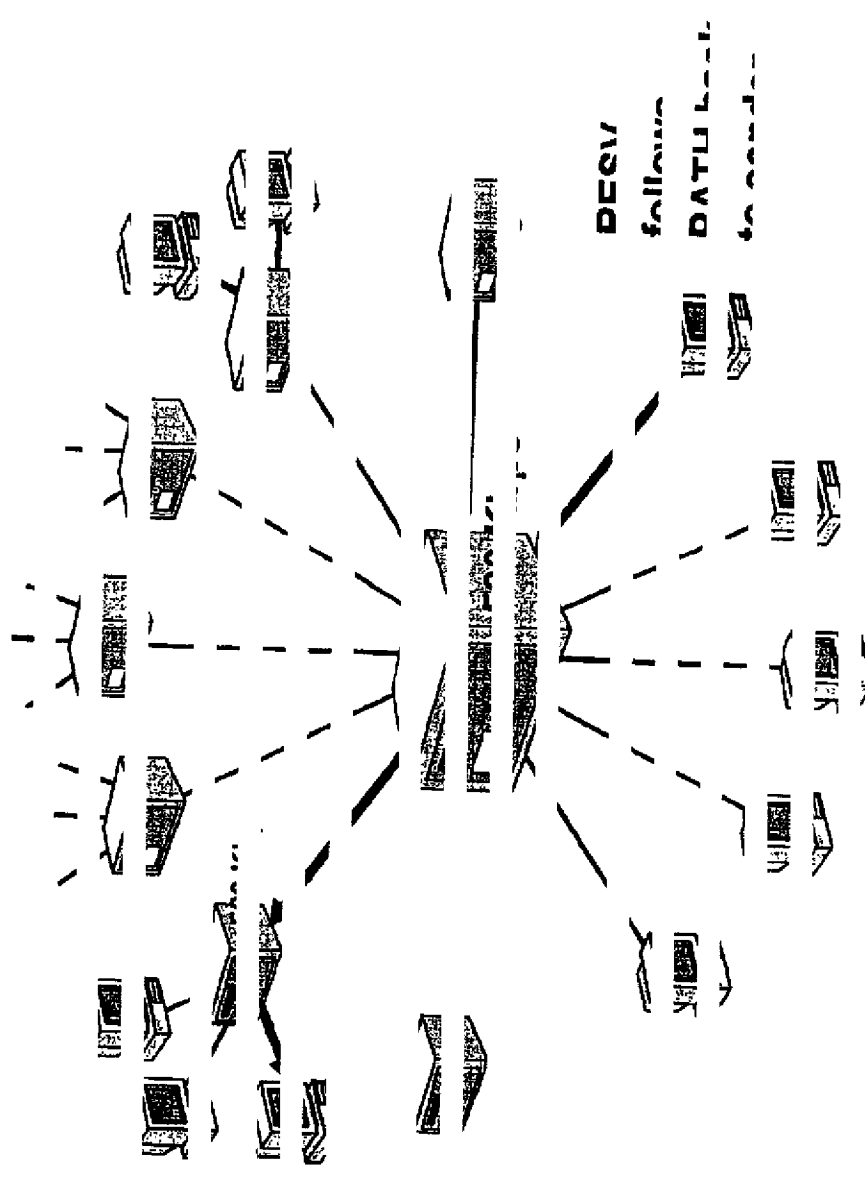
2. Client Application indicates that it is a QoS receiver

1. The PATH message and the SET_PARAMETER REPLY message arrive separately on the client

3. QoS SP sends RESV message to network

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

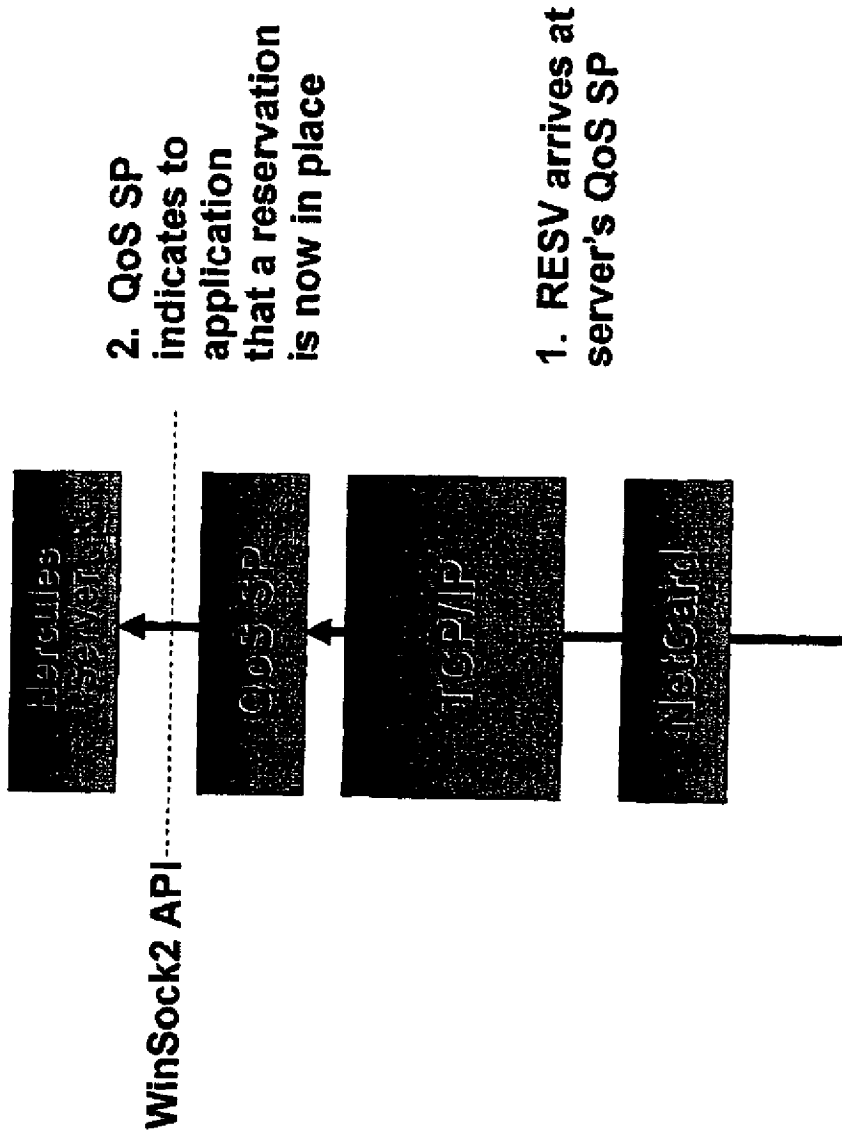
ROVR Example cont



© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited.

Microsoft
HIGHLY CONFIDENTIAL

RSVP Example cont...



© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

Networking Features

Standards

- ◆ SDP descriptions of content
- ◆ RTSP control protocol support
 - Default protocol
 - Used for both client and distribution streams
- ◆ RTP wrapped ASF data delivery
- ◆ RTCP for resend and statistics reporting (optional)
- ◆ Multicast Address Dynamic Client Allocation Protocol (MADCAP)
- ◆ SNMP based counters

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

RTSP Walkthrough

WMT Client



1. User enters
RTSP://Server/Foo.asf
and client connects to
server port 554 and
issues DESCRIBE
request

3. Client issues a
separate SETUP request
for the audio, video, and
UDP resend streams

5. Client issues PLAY
request indicating
requested offset and
rate

2. Server replies to
DESCRIBE with SDP
based description and
ASF header

4. Server responds to
each SETUP request and
includes a session ID to
be used on subsequent
requests

6. Server replies to
PLAY request and
begins sending RTP
packets down selected
path

WMT Server



© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 00000196237
HIGHLY CONFIDENTIAL

Networking Features

Standards: RTSP Interoperability

Windows Media Server will be RTSP standards compliant, but that does not guarantee interoperability with other streaming servers

- ◆ **Custom extensions for value added features**
 - **Logging information**
 - **QoS indication**
 - **Intelligent streaming**
- ◆ **Custom codecs from each vendor**

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

Networking Features

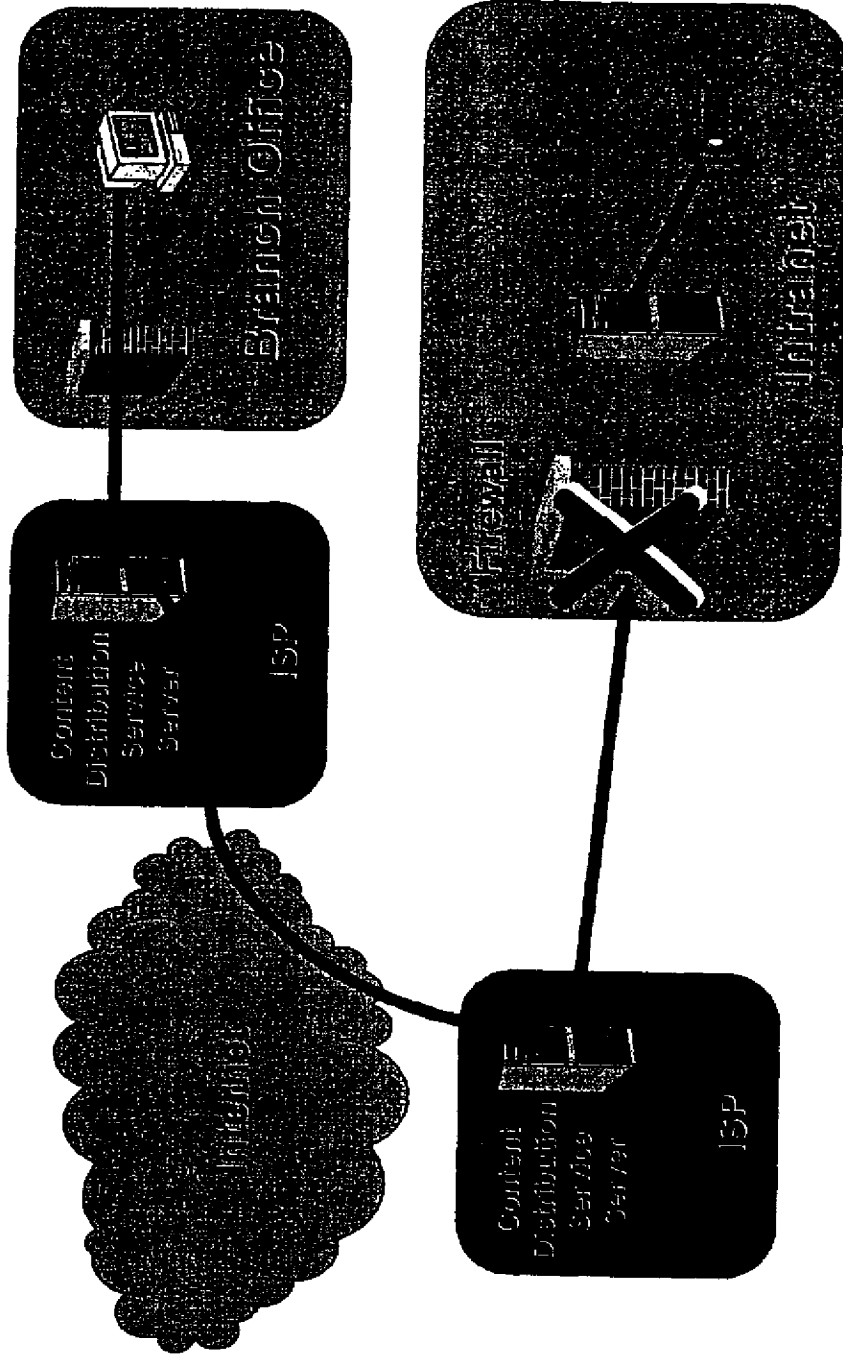
Enhanced Distribution

- ◆ **RTSP based distribution**
- ◆ **Unicast UDP**
- ◆ **Session-full multicast distribution**
- ◆ **“Push” distribution support**

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

Networking Features

Example Pull Distribution Problem

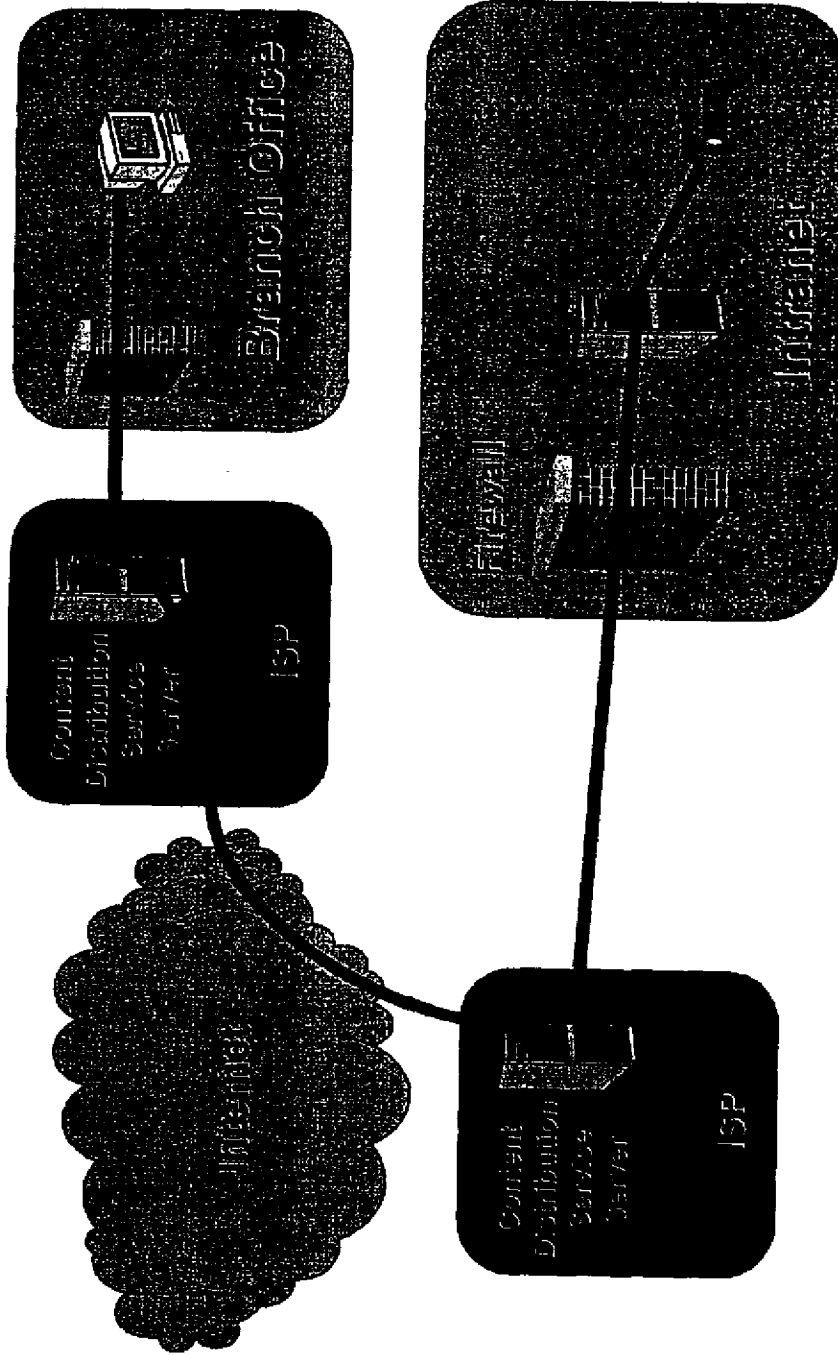


© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 00000196240
HIGHLY CONFIDENTIAL

Networking Features

Push Distribution Solution



© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196241
HIGHLY CONFIDENTIAL

Networking Features

Network management and information

- ◆ **Web Based Enterprise Management (WBEM/WMI)**
- ◆ **SNMP**
- ◆ **RSVP Signaling w/policy control**
- ◆ **Multicast Address Dynamic Client Allocation Protocol (MADCAP)**

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

Networking Features

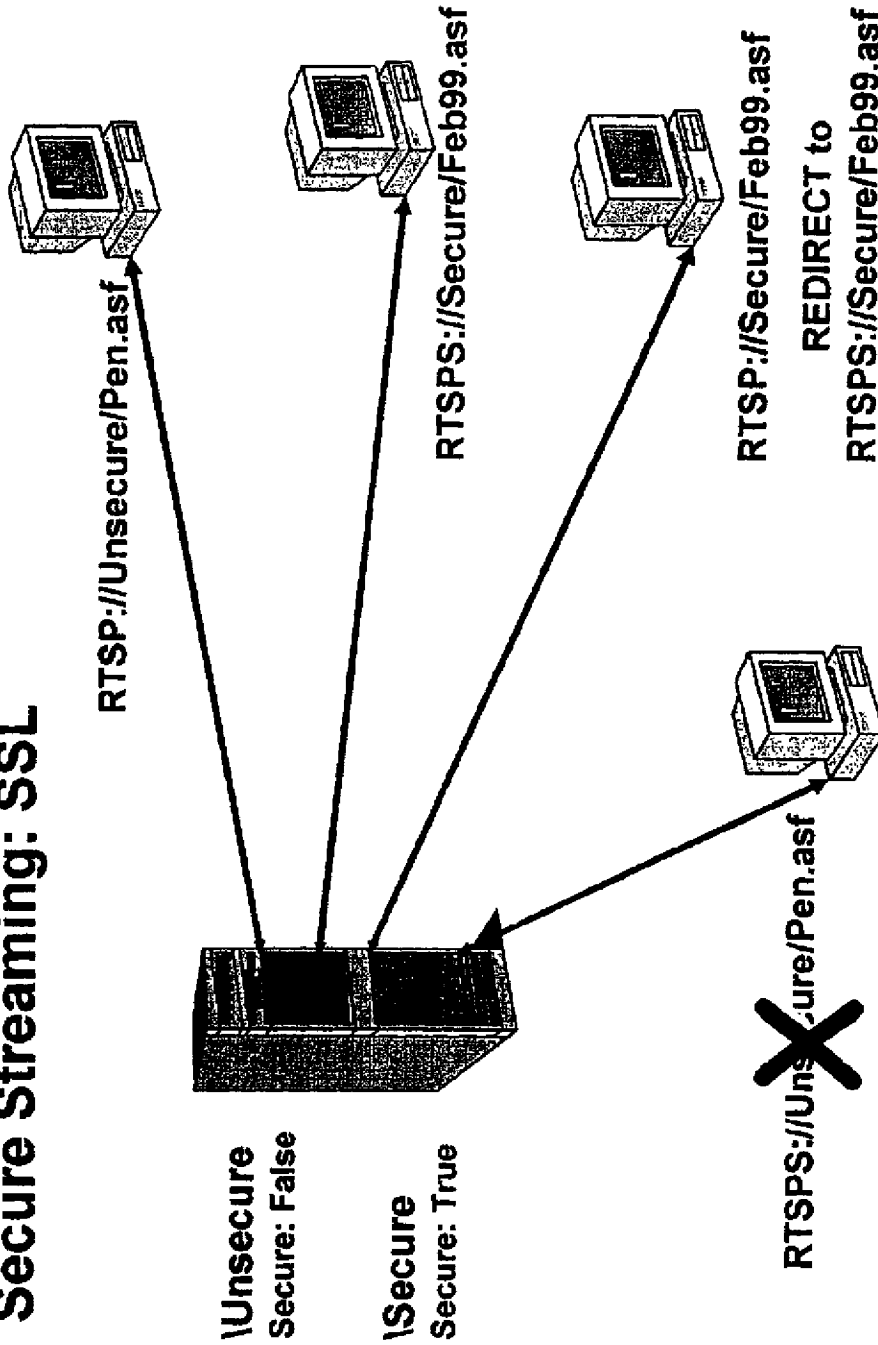
Secure Streaming and DRM

- ◆ **Over-the-wire security**
 - **SSL for control connection, data encryption**
 - **HTTPS://, RTSPS://**
- ◆ **Per-publishing point and encoder configuration**
- ◆ **DRM Integration**
 - **Real-time DRM**
 - **Import rights options into encoder and format SDK**

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

Networking Features

Secure Streaming: SSL



© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

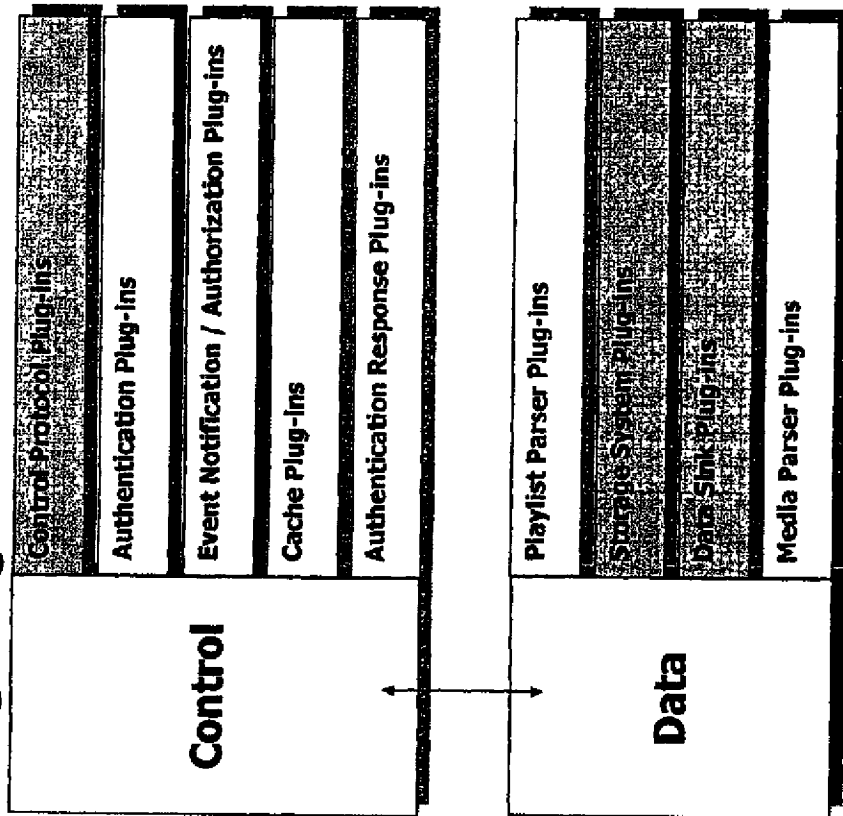
MS-CC-Bu 000000196244
HIGHLY CONFIDENTIAL

What's Implemented Today

- ◆ V4 compatible MMS and HTTP client streaming
- ◆ HTTP and RTSP distribution to Hercules server
- ◆ HTTP based distribution feed from V4.1 encoder (Note: MSBD is no longer supported)
- ◆ MMS and HTTP plugin administration

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

Platform: Plug-in Architecture Networking Plug-ins



© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 00000196246
HIGHLY CONFIDENTIAL

Networking Configuration



© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 00000196247
HIGHLY CONFIDENTIAL

Call to Action

- ◆ Fill out questionnaire
- ◆ Install the Developer's Release
- ◆ Send us feedback

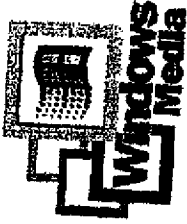
© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

Resources in CD

- ◆ **Unsupported Scenarios**
- ◆ **Release Notes**
- ◆ **Help File**

© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196249
HIGHLY CONFIDENTIAL



© 2000 Microsoft Corporation. All rights reserved. Reproduction and redistribution is expressly prohibited without prior written approval.

MS-CC-Bu 000000196250
HIGHLY CONFIDENTIAL