

RealSystem G2: Management and Control of Streaming Media Over Corporate Networks

CONTENTS

INTENDED AUDIENCE	3
OVERVIEW OF REALSYSTEM G2.....	3
TECHNICAL CONSIDERATIONS FOR STREAMING MEDIA IN AN ENTERPRISE NETWORK.....	4
HOW REALSYSTEM G2 ADDRESSES THESE CONSIDERATIONS WITHIN ENTERPRISE NETWORKS	4
RealAudio and RealVideo Codecs	4
SureStream	5
Multicast	5
Back-channel Multicast.....	5
Scalable Multicast.....	5
Network Splitters.....	6
RealSystem Administrator	6
RealSystem Monitor.....	6
Connection Control	7
Multicast Controls	7
TYPICAL NETWORK CONFIGURATIONS USING REALSYSTEM G2.....	8
Company A: 2,500 - 10,000 Users	8
Company B: 40,000 Users	9
FOR MORE INFORMATION ON DEPLOYMENT	9

INTENDED AUDIENCE

This white paper is intended for IT and MIS professionals who:

- Are considering a corporate-wide deployment of RealSystem™ G2.
- Want to know more about how RealNetworks products and technologies control media over corporate networks.
- Wish to obtain examples of corporate RealSystem G2 installations.

OVERVIEW OF REALNETWORKS REALSYSTEM G2

RealSystem G2 includes three components:

- RealProducer™, which converts audio and video files to digital media clips.
- RealServer™, which streams the clips in real-time.
- RealPlayer®, which plays the media clips.

Corporations using RealSystem G2 for on demand or live broadcast, use all three components to encode, compress, serve and playback RealMedia files.

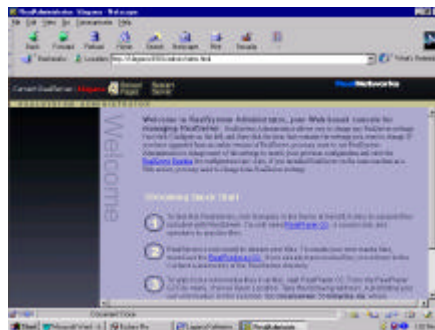
Digitized and Compressed Content



Step 1: Encode with RealProducer G2



Step 2: Serve and Broadcast with RealServer G2



Step 3: Playback Content on RealPlayer G2



TECHNICAL CONSIDERATIONS FOR STREAMING MEDIA IN AN ENTERPRISE NETWORK

Data traveling from host to end-user may traverse many network configurations with multiple transmission speeds. Also the size of the audio and video data files will vary greatly depending upon the quality at which they were captured. When streaming media to end users, corporate IT managers will consider:

- **Bandwidth availability**
How to support remote, local and international sites, solving for both high and low connection speeds.
- **The effect of streaming large media files on shared network:**
How to successfully deploy streaming media and be confident that it won't disrupt mission-critical network traffic.
- **Scalability for a growing business:**
How to start with a moderate amount of streaming media, but be able to rapidly scale users and bandwidth without needing to reinstall the system.

HOW REALSYSTEM G2 ADDRESSES THESE CONSIDERATIONS WITHIN ENTERPRISE NETWORKS

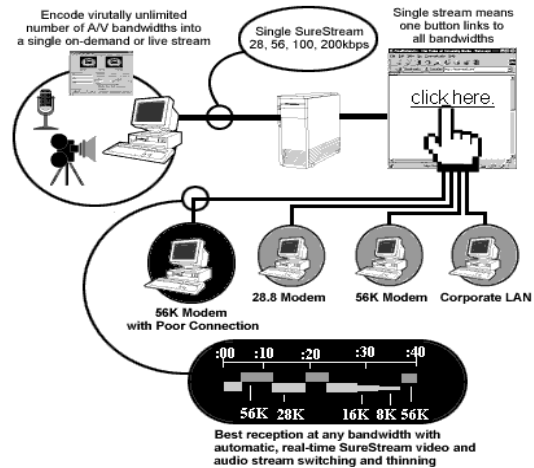
A combination of RealSystem G2 features enable network administrators to easily configure their systems to manage variable bandwidths, media file size, and network traffic:

- 1) **RealAudio and RealVideo Codecs**
 - 2) **SureStream**
 - 3) **Multicast**
 - 4) **RealSystem G2 Administrator**
- **RealAudio and RealVideo codecs**
RealAudio and RealVideo codecs compress files quickly to suit target bit rates. These compression/decompression algorithms enable relatively large files to be streamed within limited bandwidths. The following table shows the recommended maximum bit rates for streaming presentations over various network connections and how each Codec adjusts to stay within target. Within RealProducer G2, the user simply selects the target bit rate(s) and RealProducer automatically sets the appropriate A/V bandwidths.

Target Connection	Target Bit Rate	Real Audio Bandwidth	Real Video Bandwidth
28.8 Modem	20 Kbps	8 Kbps Music-G2 Stereo	12 Kbps
56.0 Modem	32Kbps	8 Kbps Music-G2 Stereo	24 Kbps
56.0 ISDN	45 Kbps	11 Kbps-G2 Stereo	34 Kbps
112 Kbps Dual ISDN	80 Kbps	20 Kbps Music-G2 Stereo	60 Kbps
10BT/Corporate LAN	150 Kbps	32 Kbps Music-G2 Stereo	118 Kbps
DSL Cable Modem	220 Kbps	32 Kbps Music-G2 Stereo	188 Kbps

- **SureStream**

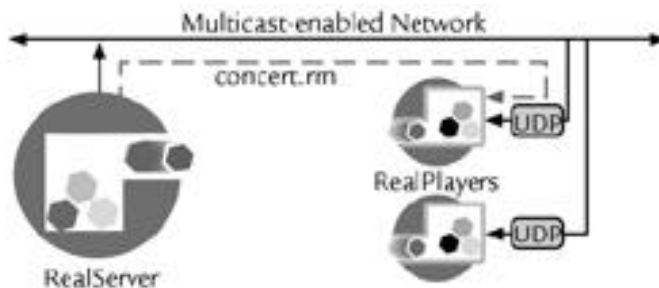
SureStream provides dynamic bandwidth adjustments, assuring the best quality signal at any bandwidth. A single RealVideo clip can be encoded for up to six target bandwidths – this enables corporate administrators to support the various connection speeds within their organization for remote and local users. For example, a single clip can be encoded for all of the target connections shown in the table above. Based on its connection speed, RealPlayer G2 receives the SureStream at 20, 32, 45, 80, 150 or 220 Kbps.



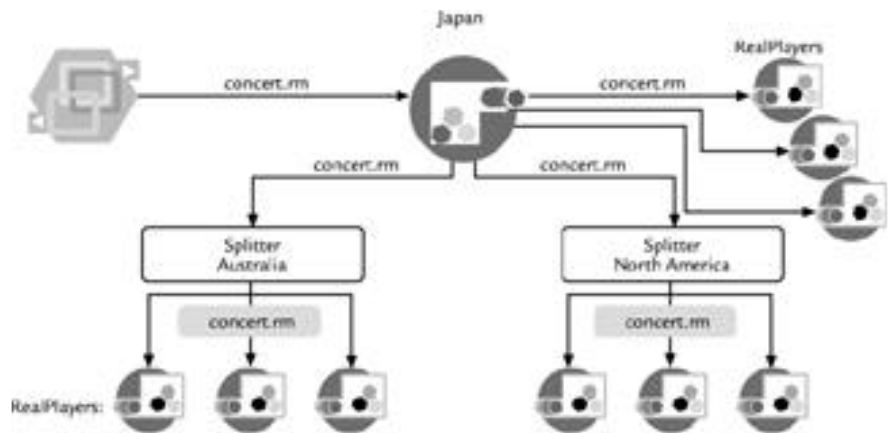
- **Multicast**

Multicast allows many players to connect to one single stream, (as opposed to Unicast where there is a 1 to 1 ratio between player and stream). When Multicast is combined with SureStream, the Player chooses the stream to tune in to based on its actual connection speed. RealSystem G2 provides two types of multicast: **back-channel** and **scalable**.

- **Back-channel multicast** is ideal when the audience is limited in size and quality of service is important. This type of multicast includes a data packet resend option that is used when multicasted UDP data packets are lost. If a client cannot connect to a back-channel multicast event, then the client will attempt to connect via standard unicast live. This failover feature is useful since a network is not guaranteed to be fully multicast-enabled. Another benefit is that Back-channel multicast content can be authenticated and user statistics can be captured within server logs.
- **Scalable multicast**, on the other hand, requires very little server resource whether serving one client or one thousand clients. Scalable multicast is ideal for large audience live events, however multicast packets are susceptible to typical network packet loss. Both multicast and unicast URL links can be provided to users in a Web page so that users on non-multicast enabled networks can tune into the same broadcast.



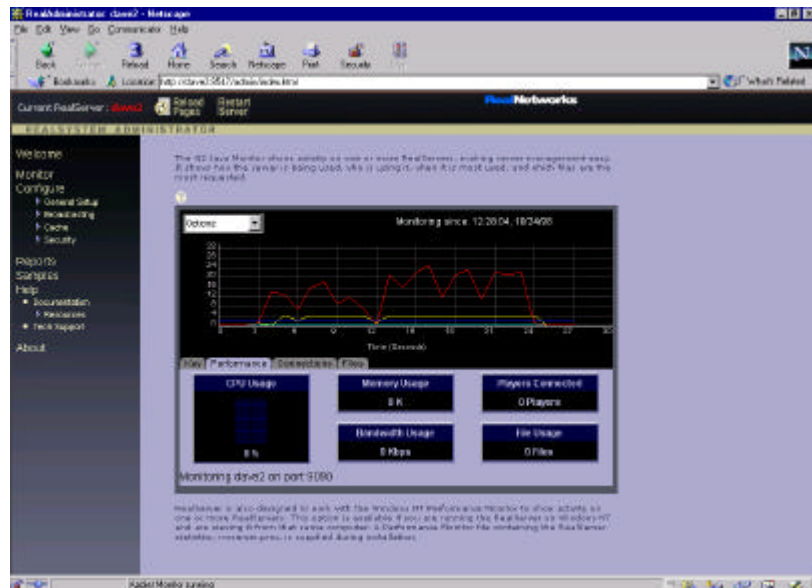
- **Network Splitters** enable one or more RealServers to join the main RealServer to distribute streams. These splitter servers can delivery multiple streams from one single stream and work well on both a multicast and non-multicast enabled network. This feature is ideal for large scale broadcasting and enables growing organizations to adapt by simply adding RealServers with splitters as remote locations increase. This also allows network administrators to easily bridge multicast and non multicast network segments, tying in remote locations with limited bandwidth



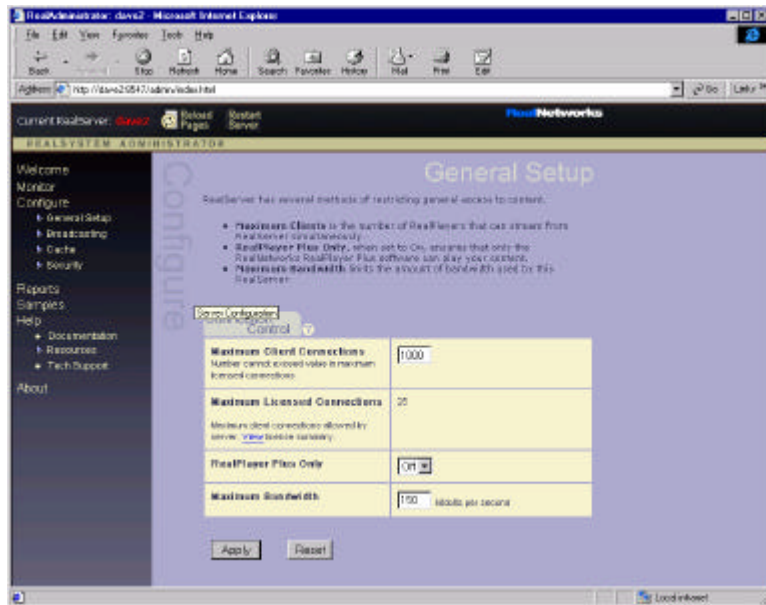
- **RealSystem Administrator**

RealSystem Administrator provides several controls that enable IT Managers to monitor user activities, set bandwidth limits, and configure multicast and network splitter features.

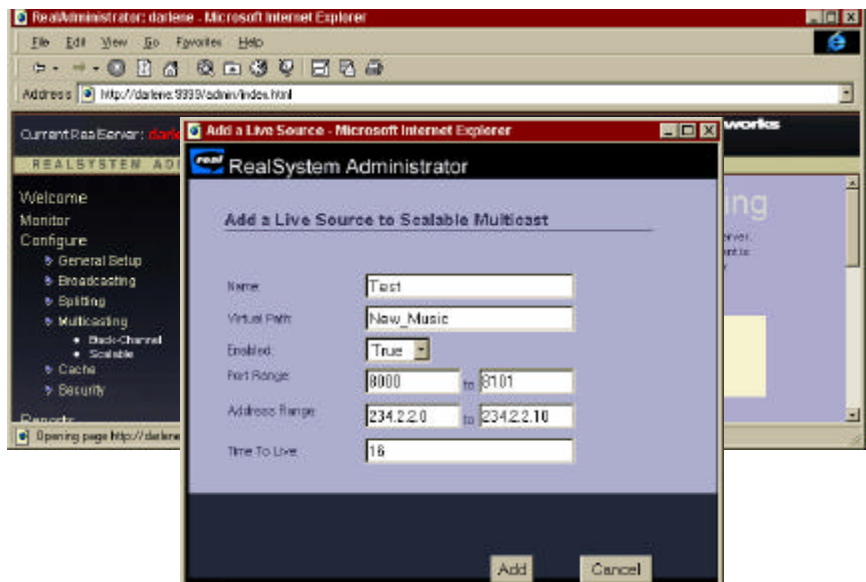
- **The RealSystem Monitor** is real-time Java Monitor displaying activity on one or more RealServers, making server management easy. It shows how the server is being used, who is using it, which files are the most requested and what the stream load is. The Java Monitor includes a configurable graph that displays real-time information about the number of clients connected to RealServer, the resources used, and which files are being streamed. Administrators can also create other external G2 Java Monitors to track more than one server, monitoring multiple RealServers side by side.



- **Connection Control** provides IT managers the ability to limit the amount of bandwidth used at any one time for streaming media. The **Maximum Clients** setting limits the number of clients who connect simultaneously. Once this limit is reached, clients that attempt to connect receive an error message, and will not be able to connect until other clients disconnect. Similarly, the **Maximum Bandwidth** setting limits the amount of bandwidth RealServer can use to any number of kilobits per second (Kbps). If you establish values for both variables, RealServer will limit access when the lower threshold is reached.



- **MultiCast Controls** enable IT Managers to set Ports, IP multicast addresses and packet resend options. It also give the Administrators control over delivery options and user lists. For more detail on how to set up Multicast and Splitters see the IP MultiCast in RealSystem G2 Whitepaper or the RealSystem Administrator User Guide.



TYPICAL NETWORK CONFIGURATIONS USING REALSYSTEM G2

The scenarios below show how each of these technologies are used within different network configurations.

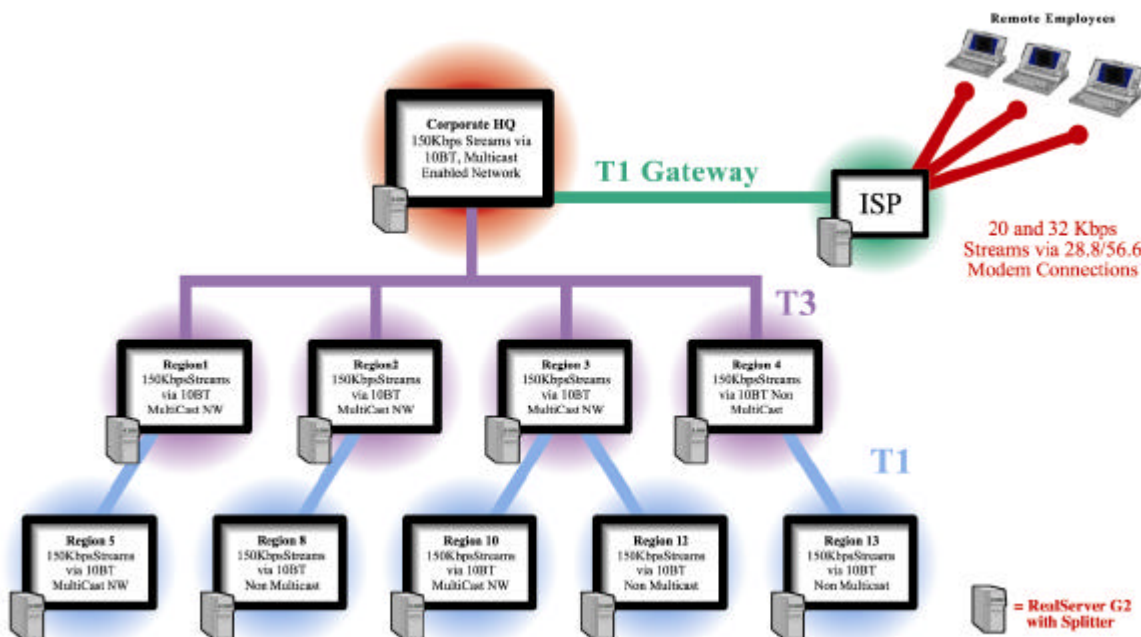
Company A: 2,500-10,000 Users

Company A uses RealSystem G2 to provide monthly live and archived sales training broadcasts to the entire sales force. Other applications include producing product and market updates for account managers to reference at their convenience. The sales force is spread across the network with sites initially located at corporate headquarters, on a local network (mix of 10 and 100BT), and 2 regional centers connected via the T1 wide area network, with a T1 Gateway for dial-up access for remote employees.

As the company grows to 10,000 employees world wide, RealSystem G2 media broadcasts are used for new hire training, HR Benefits, policy updates and software training. The network enables the majority of employees to access content from now thirteen local area networks, connected by a T1 and T3 wide area network. There continues to be large group of remote employees who will access the streams via their dial-up modems.

At headquarters, the content is SureStream encoded for 150Kbps and 20Kbps using RealProducer G2, supporting the company's multiple connection speeds. Each Regional office has a RealServer G2 with a Splitter. The Splitter allows the many Regional office employees to tune into the single stream. Another benefit to having a G2 Server at each location is that each regional office can now support on demand viewing, after live broadcast, reducing cross network traffic.

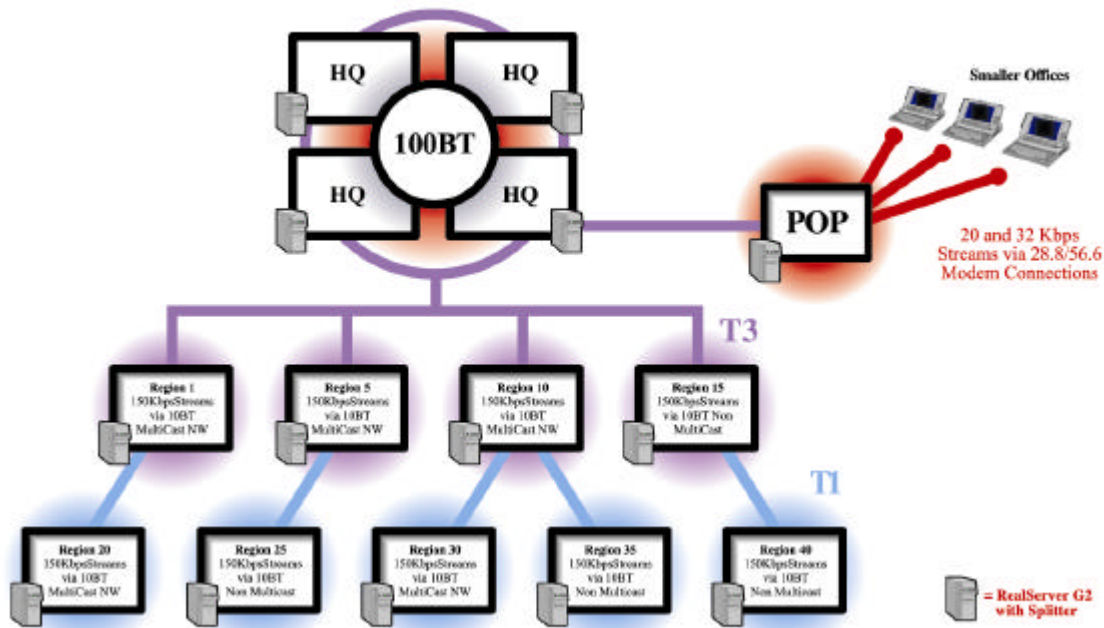
Not every Regional office is multicast enabled, so in some instances Unicast is used to reach a Region's employees. This is also handled by the Regions' RealServerG2 and Splitters. The central IT Manager uses the RealSystem Administrator to control maximum bandwidth consumption and Multicast settings (host settings, port ranges and resending of packets) for the servers at the various regions.



Company B: 40,000 users

Company C uses RealSystem G2 for daily corporate communications, such as executive broadcasts, as well as on demand training and certification processes. The training content is particularly critical to the company as “best practices” need to be consistent across all international divisions. The company’s infrastructure is composed of 40 100baseT and 10baseT local area networks connected via a wide area network using T3 and T1. This company also has several small offices based in smaller countries with only 56K and 128K ISDN access to the network.

In this scenario the content is SureStream encoded for 45-150Kbps. Not every Regional office is multicast enabled, so in some instances Unicast is used to reach a Region’s employees. This is managed by the Regions RealServerG2 and Splitters. At each server location the IT Manager uses the RealSystem Administrator to control maximum bandwidth consumption and Multicast settings (host settings, port ranges and resending of packets). Back Channel multicast is used to track user statistics and the RealSystem Administrator has been set to only allow viewing based on IP address and a specified user list.



FOR MORE INFORMATION ABOUT REALSYSTEM G2 IN CORPORATE ENVIRONMENTS

Go to:

<http://www.real.com/solutions/enterprise/deploy.html>

Information in this document is subject to change without notice. Companies, names, and data used in examples herein are fictitious unless otherwise noted. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without the express written permission of RealNetworks, Inc.

© RealNetworks, Inc.

RealAudio, RealVideo, and RealPlayer are registered trademarks of RealNetworks, Inc.

The Real logo, RealServer, RealPlayer Plus, RealText, RealPix, RealAudio Encoder, RealVideo Encoder, RealEncoder, RealPublisher, RealProducer, RealProducer Plus, RealProducer Pro, SureStream, RealBroadcast Network, and RealSystem are trademarks of RealNetworks, Inc.

RealFlash is a trademark of Macromedia, Inc. and RealNetworks, Inc.

Macromedia is a registered trademark and Flash is a trademark of Macromedia, Inc.

Other product and corporate names may be trademarks or registered trademarks of other companies. They are used for explanation only, with no intent to infringe.