

Introduction

This paper provides guidelines to determine bandwidth requirements of a home networking technology to support home media distribution service. The paper identifies bandwidth requirements for different types of audio and video streams. Based on per stream bandwidth estimates, overall bandwidth requirements for a home network can be determined by establishing a typical service scenario in the home, characterized by number of simultaneous streams of different types.

Bandwidth requirements for different audio and video streams

In case of audio streams, different encoding techniques need to be taken into consideration. For video streams, in addition to different encoding technique (MPEG-2 and MPEG-AVC), it is necessary to consider different types of contents (Std-Def vs. Hi-Def, Movies vs. Sports, etc.)

Table 1 & 2 identify bandwidth requirements for different video streams and audio streams, respectively.

Table 1: Home Network Bandwidth Requirements for Video Streams

Type of Video Stream	Std-Def	Hi-Def
MPEG-2 Movies	CBR: 2 to 6 Mbps VBR: 4-14 Mbps DVD Max: 9Mbps	6-32Mbps
MPEG-2 Sports	Upto 8 Mbps	Upto 19.6 Mbps
MPEG-AVC/H.264-Movies	1 Mbps	4-7 Mbps
MPEG-AVC/H.264-Sports	2 Mbps	6-9 Mbps
IP Transport- PC Streaming (Real, WMA etc)	500Kbps-2Mbps	7-10Mbps

Table 2: Home Network Bandwidth Requirements for Audio Streams

Encoding Technique	Bit Rate
Dolby-AC3	w/ 2 Channels- 102Kbps and w/ 5.1 Channels- 384Kbps
MP3 (MPEG-1 Layer-3)	W/ two 2 Channels- upto 192Kbps
AAC	CD-Quality-100Kbps
HE-AAC (licensable as MPEG-4 Audio- Newest standard)	Conversation-12 kbps, CD-Quality-48 kbps, 5.1-128 kbps
Windows Media	CD Quality – 60Kbps w/ Surround Sound – 128Kb

From Tables 1 & 2, it is evident that video streams determine the upper limit of bandwidth requirements for a layer-2 home networking technology supporting home media distribution.

Home Media Distribution Service Scenario

Bandwidth requirements of a home networking technology supporting home media distribution can then be determined by estimating number of simultaneous streams of different types in the home. A typical service scenario in the home can be characterized by the following streams occurring simultaneously:

- 1 Hi-Def streams
- 2 Std-Def streams
- 2-3 Audio Streams
- 1-2 PC Streams

A home networking technology aimed at supporting home media distribution should be able to support such typical service scenario. It is also desired that a home networking technology has a buffer of excess bandwidth capacity beyond what is required for a typical home media distribution service scenario, so that additional streams can be accommodated as future services are rolled out (e.g. multiple Hi-Def streams, etc).