



## MORE ON HIGH QUALITY VIDEO CALLING

[TV TechCheck of March 9, 2009](#) reported on a new technique for electronic newsgathering (ENG) using video calling over broadband Internet. NAB put the technology to the test at the Broadcast Engineering Conference (BEC) in April when a speaker, Thomas Ray of Buckley Radio, was unable to travel to Las Vegas for the event. By using a live video link with Skype technology, Tom was able to present his paper on *An AM Directional Antenna and HD Radio* from his home in New York.

We can report that the video and audio quality was excellent, including two-way audio communications with low-latency. The pictures below show the set-up for the presentation in the conference room.



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The following update on using video calling for broadcast has been written for *TV TechCheck* by Julian Spittka of Skype Audio/Video Group, who presented the paper on high-quality video calling at the BEC.

## Introduction

In today's broadcasting world, whether it is news, game or shopping shows, all of these programs often include talent and guests from all over the world. Until recently, this sort of acquisition has been done with special ENG trucks or guests had to travel to studios. However, several factors limit traditional ENG:

1. Availability: ENG trucks or studios are not always available where news is happening.
2. Interactivity: A traditional ENG connection is not a very interactive way of communicating. The connection to the studio is half-duplex and often, especially in the case of satellite connections, latency is high. Reporters have to be trained and live interviews are difficult.
3. Cost: The cost of an ENG truck is in many cases prohibitively high. Also, sending talent to the location is inconvenient and expensive.

In those cases, traditional ENG can be complemented by high quality Internet video.

## What is Internet High Quality Video Calling?

A high quality video calling application like Skype allows broadcasters to make a high quality video call from any location where a broadband Internet connection is available. There simply needs to be two end-points that are talking to each other and the data is exchanged via the Internet.

There are four elements required for making a high quality video call:

1. A fast and properly configured computer.
2. An appropriate network setup.
3. A good audio setup.
4. A good video setup.

## Computer Hardware

Choosing the right computer hardware is fairly straightforward. The video processing algorithms demand the right resources. Therefore, the computer should have a fast CPU with sufficient memory to allow enough margins for low latency, high quality video calls. Most computers available at electronics stores have sufficient speed and memory to support Skype video calls.

To further optimize the video call quality, it's important to disable all personal firewalls, the virus scanner and similar options for the duration of a call as these software elements can introduce additional latency and jitter to the data stream. The same is true for other software that accesses the Internet or impairs the computer's performance.

## Network Setup

The computer that runs a high quality video call requires access to sufficient broadband network speed. Skype recommends testing the PC's connection speed via a site like [www.speedtest.net](http://www.speedtest.net). For a high quality video call the network bandwidth should be greater than 400 kbps and for an audio-only call, it should be about 50 kbps. Within the application, audio and video are sharing the network resources. Skype has invested significant resources over the last few years to accurately estimate the available network resources on the network and to find a good trade-off for allocating them for audio and video. In addition, we are constantly improving our algorithms. Just recently, Skype announced a new speech codec called "SILK" that reduces the network bandwidth requirement by up to 50 percent while improving the speech quality at the same time.

Again, everything that could impair the data stream should be removed. Typical impairments include WiFi, firewalls and some restrictive NATs. A firewall can make it necessary for the data traffic to be routed through a proxy which limits the throughput and increases latency. The best broadband Internet connection is worthless when it's slowed down this way.

In summary, a poor network setup can lead to higher latency, lower video resolution and frame rates, as well as audio distortion.

## **Audio Setup**

Skype uses high fidelity speech that makes a call much more natural and more intelligible when compared to traditional telephones. The aforementioned speech codec, "SILK," increases the audio sampling frequency from 16 kHz to 24 kHz.

Skype calls can also be made hands-free. This way, callers can speak naturally, similar to an in-studio conversation. To ensure that hands-free video calls are broadcast-quality, be sure to use a microphone and high quality speakers, preferably USB, as they prevent the audio from picking up noise and hum from the computer. Also, background noise like fans and humming from a refrigerator, TV or similar electronic devices should be eliminated, as it makes the algorithms that cancel out the echo from the microphone signal less efficient.

Improper audio set-up with high quality Skype video calling can lead to two problems:

1. **Audio Fading or Drop-Outs:** the audio from the side speaking the loudest will come through, while the other party's audio cuts out. The conversation becomes more difficult, as the side that is loudest does not notice when the other side tries to speak.
2. **Residual Echo:** as anyone who has ever experienced residual echo can attest, trying to speak while hearing your voice's echo is extremely frustrating.

To ensure proper audio setup, a good practice is for each side to ask the other about the audio quality during advance testing.

## **Video Setup**

The video setup for a high quality Skype video call is simple, as there are not that many components that interact with each other. However, it is important to keep in mind that video resolution and frame rate are adaptive. Mostly, they adapt to the available network bandwidth but there are a few things that can affect it and require your attention.

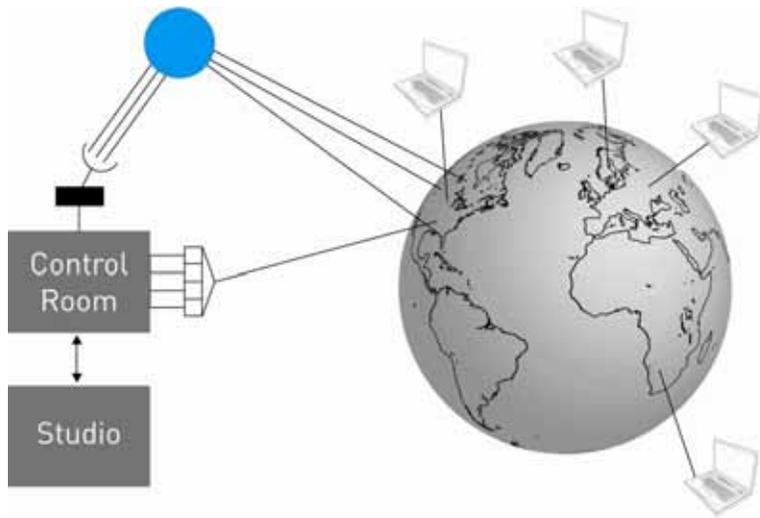
For a high-quality video call, you will need a camera that supports at least VGA (640x480) resolution and a frame rate of 30 frames per second. There are a number of options for low-cost consumer Webcams available from various manufacturers, but a high-end DV camera can be used just as well.

Additionally, even though a caller might be far away, don't forget the basics. Video quality can be improved by good lighting and proper framing of the remote caller. The remote caller should also avoid wearing clothing with bold patterns.

## **Integrating High Quality Video Calling Into a Broadcast**

High quality video callers can be located anywhere in the world where a broadband Internet connection is available. Callers connect to the studio via high quality Internet video calling and for every remote caller, there needs to be a high quality video client running at the studio.

The control room receives all the video and audio streams and can integrate them into the program, just like any other video or audio source from the studio. Also, the control room can choose to send any video or audio source back to the remote caller, including mixing together several remote callers. The studio then becomes a conference mixer for both video and audio and provides the correct mix to the remote callers.



### Skype Kits

We have found that an easy way to ensure high quality setup is by using “Skype Kits.” A Skype Kit contains everything needed for a high quality video call and can physically be sent to remote callers: a laptop, high quality video Webcam, microphone and speakers. This way all the unknowns, except for the Internet broadband connection, are removed and the only thing that needs to be screened in advance is the network connection.

### Key Take-Aways

To summarize:

1. High quality video calling allows news gathering worldwide using a broadband Internet connection.
2. High quality video calling is a robust



and effective technology.

3. Deployment is simple; Skype Kits can easily be shipped anywhere in the world.

### **Additional Benefits of Using Skype for Broadcasting**

For broadcasters integrating high quality video, Skype offers a community of 443 million registered users from which to recruit guests. Broadcasters can also complement traditional ENG by using SkypeOut calls (calls from a Skype client to a non-Skype client that typically cost 2.1 cents per minute) to save money on PSTN calls.

### **Where Will High Quality Video Calling Go From Here?**

Technology is evolving and so are computers which will become more powerful and affordable. Likewise, networks will become faster. As a result, we will see higher resolution video, higher frame rates and crisper, more natural audio. It will become easier to run multiple channels of video and mix them together.

We are just at the beginning of high quality video calling. It's a fairly new, but proven technology and more features and improvements can be expected for TV programs in the near future.

In addition, Skype in high definition is now available for testing. Currently, Skype can deliver up to 720p resolution. The actual resolution and frame rate is highly dependent on the resources available. We achieved the highest resolution when we used the following test configuration:

1. High-end Sony HD camera.
2. High-definition-specific capture card.
3. Quad-core PC, which may provide more power than needed; we are still defining the exact requirements.
4. An excellent network connection of at least 500 kbps.

High definition video calling is available in the latest Skype 4.0 for Windows client. We believe the video call quality is so good that we currently equip some of our own conference rooms with it so we can gather feedback to further enhance the Skype platform. The move to high definition video sharing is a big step forward for Skype and will help to further enhance broadcast ENG.

### **For More Information**

To learn more about using Skype in broadcast, please visit the Skype Website at:  
<http://skype.com/media/broadcast>



### **NAB Satellite Uplink Operators Training Seminar October 5 - 8, 2009 • Washington, DC**

This four-day course is designed to instruct about uplink operational practices, which minimize the risk of satellite transmission interference.

This is an important course since the FCC rules require that a trained operator be present at all times during transmissions, either an earth station site or designated remote control point. Go to <http://www.nab.org/satelliteSeminar/> or Contact NAB Science & Technology Department at (202) 429-5346 or [ccolerid@nab.org](mailto:ccolerid@nab.org) for information about the NAB Satellite Uplink Operators Training Seminar. If you are interested in sponsorship opportunities for this event contact NAB Advertising at (800) 521-8624 or [advertising@nab.org](mailto:advertising@nab.org).

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