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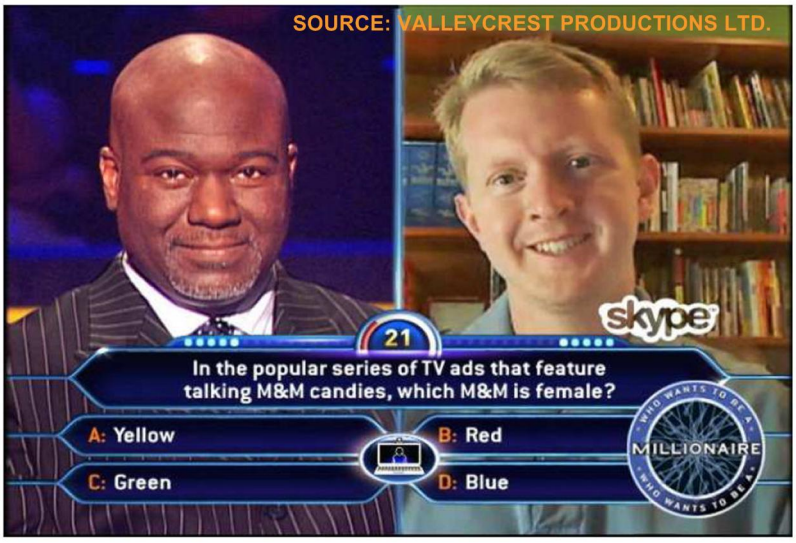
High Quality Video Calling for Broadcasters

Internet video calling, originally a difficult to configure and relatively low quality service, has evolved into a streamlined, high quality, and reliable offering to enable broadcasters to put virtually anyone, anywhere in the world live and on-air quickly and easily. A session at the upcoming NAB Broadcast Engineering Conference (BEC, April 18-23, 2009, Las Vegas, NV – see below for additional information) entitled "*Newsgathering for Television Broadcast*" includes a paper, excerpted here, discussing how a new class of Internet video service, high quality video calling, can be seamlessly integrated into broadcast programs.

INTRODUCTION – electronic news gathering (ENG) has historically been the most common choice for live television or live recording. ENG is almost always handled by special trucks that go on-site to the point of interest. The backhauling of the remote signals to the studio is accomplished either by using point-to-point terrestrial microwave or satellite connections. High quality video (HQV) calling services such as Skype, which use the Internet vs. microwave or satellite connections for backhauling, can be utilized as a supplement to ENG. This paper discusses the equipment that is needed and how the equipment should be deployed and configured to achieve the best possible quality when utilizing HQV. Some of the underlying technologies will be explained in more detail to provide a foundation for understanding the problems and solutions surrounding the integration of HQV calling into broadcast operations.

HQV CALLING FOR BROADCASTERS – sending video and audio data over the Internet differs greatly from traditional delivery methods. Video and audio streams need to be captured, digitized, encoded and assembled into "packets" for transmission over the Internet. Audio and video calling applications also differ from regular data applications like Web browsing in that they require reliable, real-time transmission to ensure that conversations are low latency and intelligible. Unfortunately, given the nature of the Internet, strict quality of service cannot be guaranteed. Packets are queued in network buffers, routers and switches, leading to additional latency on top of the time it takes to travel the pure physical distance. Further, each time a packet is processed at the intermediate nodes in the network, timing is altered. This causes a variation in travel time known as jitter. In a worst-case scenario, packets are dropped on the way due to network congestion or arrive too late to be processed in a real-time manner, leaving gaps called packet loss. While little can be done to reduce latency due to the travel time of a packet and queuing on the way, the effects of jitter and packet loss can be reduced with advanced processing techniques at the endpoint.

The global and increasingly ubiquitous nature of the Internet allows connections from callers wherever a broadband connection is available. Any computer that is capable of running an HQV calling client with a webcam, speakers and microphone attached that is connected to a broadband Internet connection is sufficient. Back at the studio, HQV callers will connect to a computer that runs the same HQV calling application. Video and audio signals received from remote HQV callers are captured from the local PC and provided to the control room where they can either be recorded or further processed for integration into a program feed. An example is shown here, where an HQV calling image (at right) is integrated with a studio image (at left).



HQV CALLING TECHNOLOGY – in any HQV calling application there are three elements that greatly affect the quality of the calling experience – network transport, audio and video:

- *Network transport* – the Internet is not well-defined in terms of quality. A lot depends on how and where you are connected. Remote guests with HQV endpoints will connect through different broadband access technologies at different throughput speeds (cable, DSL, Ethernet, fiber or wireless). Each access method has its own quirks – latency, jitter and crosstalk. Furthermore, the guest's computer might be separated from the Internet by a firewall or network address translation (NAT). For the best possible calling experience, the client should not be separated by firewalls (or some of the forms of more restrictive NAT—in most cases NAT will not affect quality);
- *Audio* – the importance of audio over video is a topic of much discussion. The best video connection has little use as a communication channel without the accompanying audio transmission. Therefore, any HQV calling technology should be complemented with state of the art voice over Internet protocol (VoIP) technology;
- *Video* – essential for every HQV calling application and very important for broadcasters is video quality. Video picture frames have to be captured, pre-processed in an encoding manager to adjust resolution and frame rate to the desired levels, compressed by an encoder, and packetized for transmission over the network. CPU utilization on the host computer is closely monitored to avoid a stalling of video (or audio). Video resolution and frame rate will be lowered when CPU resources run low. Therefore, a powerful computer, for example a Core Duo CPU with at least 2 GHz clock speed, ensures the best possible performance.

This paper is authored by Julian Spittka, Skype, Inc. It will be presented on Tuesday, April 21, 2009 starting at 10:00 a.m. in room S226/227 of the Las Vegas Convention Center. It will also be included in its entirety in the *2009 NAB Broadcast Engineering Conference Proceedings*, on sale at the 2009 NAB Show Store and available on-line from the NAB Store (www.nabstore.com) after the convention. For additional conference information visit the NAB Show Web page at www.nabshow.com; a complete listing of the TV-related BEC conference sessions, papers, and presenters can be found in the February 2, 2009 issue of *TV TechCheck*.

TECHNOLOGY INNOVATION AWARDS DEBUT AT 2009 NAB SHOW

NAB has selected the National Institute of Information and Communications Technology (NICT) and the NHK Science and Technical Research Laboratories to receive NAB Technology Innovation Awards. This new award recognizes organizations that bring exhibits and demonstrations of significant merit to the NAB Show, presenting advanced research and development projects in communications technologies. The awards will be presented Wednesday, April 22 during the NAB Show Technology Luncheon.

The Technology Luncheon will include a keynote presentation by digital media research scientist Mimi Ito, and will also feature the presentation of the prestigious NAB Engineering Achievement Awards. Since 1959, the awards have honored individuals who have made outstanding achievements and contributions in the broadcast engineering profession. For additional information on the NAB Show go to www.nabshow.com.

DON'T MISS THIS CHANCE TO ATTEND THE NAB FUTURES SUMMIT MARCH 22-24

The NAB Futures Summit is a unique opportunity to hear fresh ideas, many of which are based on technologies new to the broadcast industry. The Summit attracts visionary thinkers who are interested in networking with broadcasters and formulating win-win alliances and partnerships. The Summit offers the perfect venue to meet with peers from the broadcast industry and discuss new strategies for these critical times.

The NAB Futures Summit will be held March 22-24 at The Inn at Spanish Bay in Pebble Beach, CA. The Summit will include 13 sessions and four panel discussions all focused on innovative, bold ideas that help generate revenue, reduce expenses and enhance asset value. Topics on the agenda include mobile devices and strategies, wireless, TV and Internet, new business opportunities, corporate strategies and new media platforms.

For more program and registration information on the 2009 NAB Futures Summit go to: http://www.nab.org/AM/Template.cfm?Section=Futures_Summit.