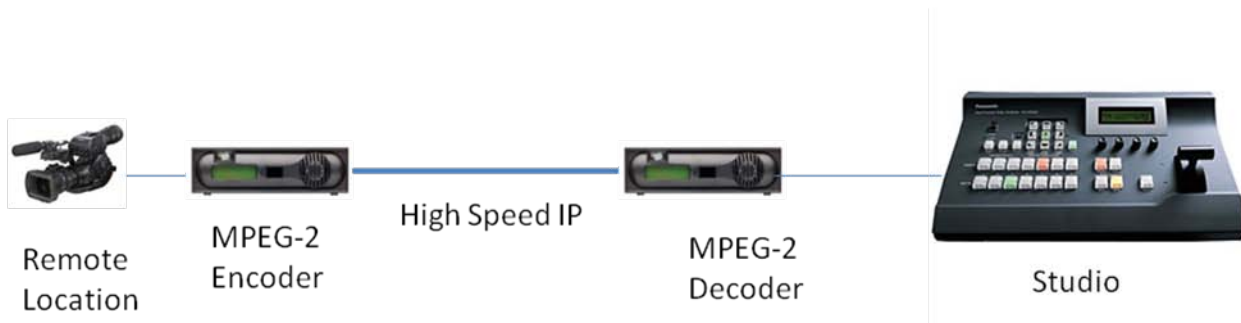


## Remote Trunking of live video and audio to broadcast studio

There are several alternatives for delivering live video/audio feeds from remote locations. A lot depends on the network connectivity between the remote location and the studio. Below are some common scenarios and the recommended equipment from Discover Video:

### High Speed IP Network (MPEG-2 technology)

If a high speed network, typically fiber optic based, is available with at least 5 Mbps of bandwidth one of the recommended solutions is based on MPEG-2 technology. A VBrick MPEG-2 encoder appliance can be connected to the video source at the remote location. It then encodes the video and audio into a digital IP stream which is transported to the studio where an MPEG-2 decoder appliance can convert the stream back to analog video. The MPEG-2 appliances preserve the broadcast video/audio quality and provide up to 720 x 480 broadcast resolution at 30 Fps.



#### Advantages:

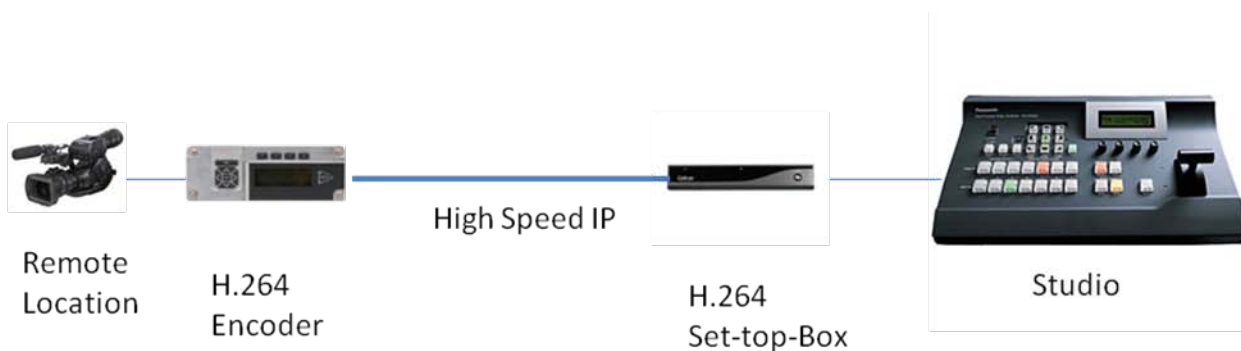
- Very reliable, high quality delivery
- Uses standard MPEG-2 video compression – broadcast standard

#### Disadvantages:

- Requires at least 4 Mbps of bandwidth to provide DVD quality video
- Not upgradeable to H.264 Video compression or HD

### High Speed IP Network (H.264 Technology)

If a high speed IP network is available, typically fiber optic based, with at least 2 Mbps of bandwidth the one of the recommended solutions is based on H.264 video compression technology. A VBrick H.264 encoder appliance can be connected to the video source at the remote location. It then encodes the video and audio into a digital IP stream which is transported to the studio where an H.264 decoder appliance (set-top-box) can convert the stream back to analog video. The H.264 appliances preserve the broadcast video/audio quality and can provide up to HD 720p resolution at 30 fps, and also operate a lower bit rates and lower resolutions.



#### Advantages:

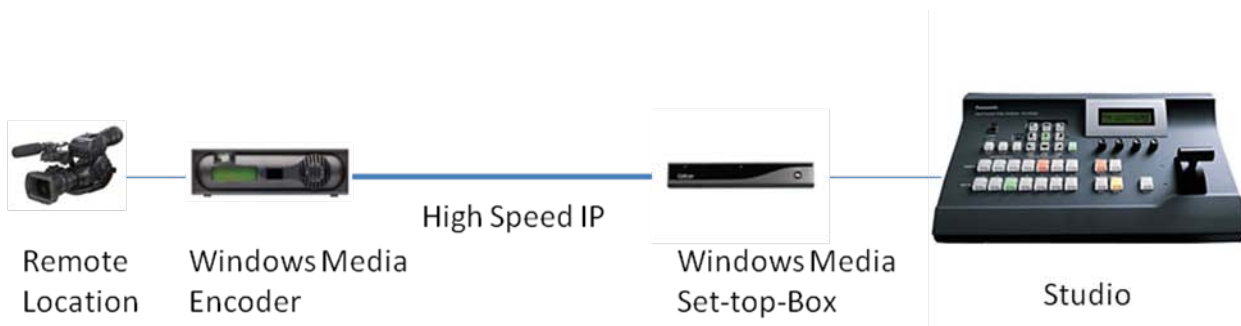
- Lower bandwidth to achieve the same result as MPEG-2
- Higher quality video, up to 720p resolution
- Uses latest video compression

#### Disadvantages:

- Higher cost compared to Windows Media or MPEG-2
- H.264 STB not as reliable as a an MPEG-2 VBrick decoder appliance

### High Speed IP Network (Windows Media technology)

If a high speed fiber network is available, typically fiber optic based, with at least 2 Mbps of bandwidth the one of the recommended solutions is based on Windows Media (VC-1) video compression technology. A VBrick WM encoder appliance can be connected to the video source at the remote location. It then encodes the video and audio into a digital IP stream which is transported to the studio where a Windows Media decoder appliance (set-top-box) can convert the stream back to analog video. The Windows Media appliance preserves the broadcast video/audio quality and can provide up to 640 x 480 resolution at 30 fps.



#### Advantages:

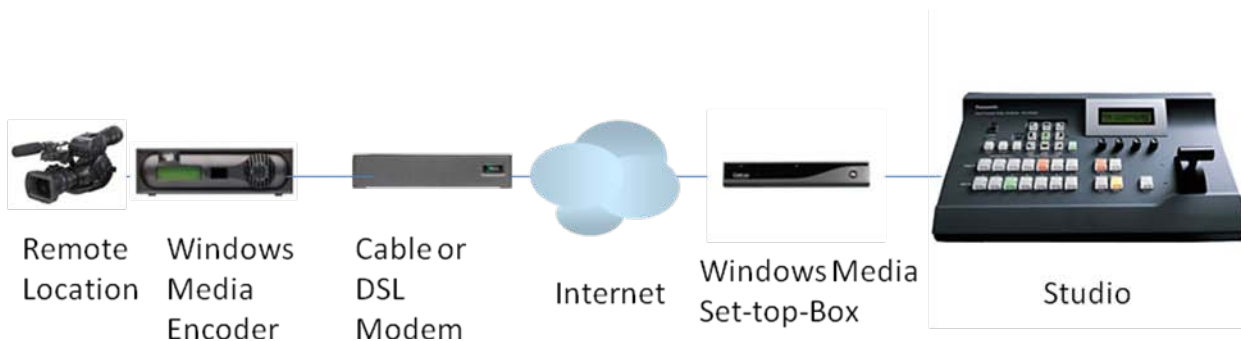
- Can provide up to 640 x 480 resolution (full screen decoding, near DVD-quality)
- Least expensive VBrick solution for video trunking
- Flexible WM Appliance can be used for other applications such as Internet streaming
- Can also use WM Appliance for low bandwidth wireless/cellular streaming

#### Disadvantages:

- Does not provide HD streaming
- Uses WM STB for decoding - not as reliable as a VBrick MPEG-2 decoder

Internet with DSL or Cable Modem connection (Windows Media)

If a high speed IP network is not available it is possible to use the Internet to deliver the video live from remote locations. At the remote site you would need a cable or DSL modem with at least 500 Kbps upstream bandwidth. A VBrick WM encoder appliance can be connected to the video source at the remote location. It then encodes the video and audio into a digital IP stream which is transported over the Internet to the studio where a Windows Media decoder appliance (set-top-box) can convert the stream back to analog video. The Windows Media appliance preserves the broadcast video/audio quality and can provide up to DVD resolution at 30 fps.



Advantages:

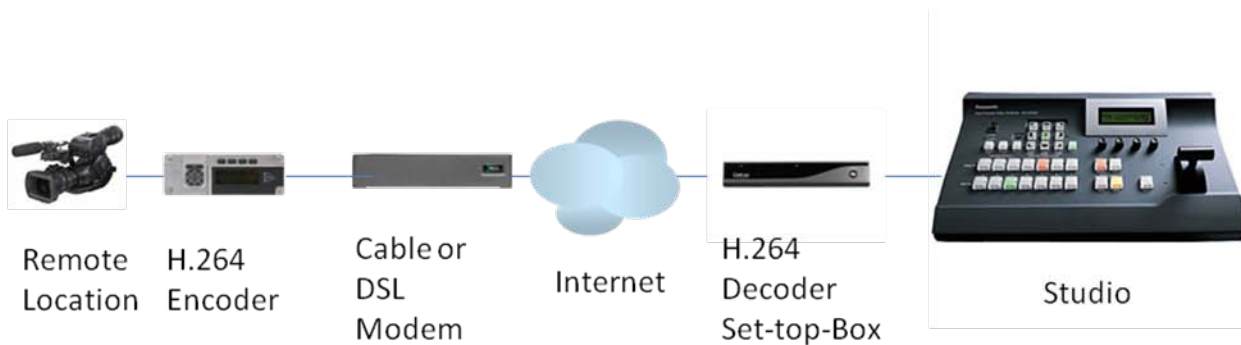
- Can provide up to 720x480 resolution and wide range of frame rates
- Can be used almost anywhere a DSL or Cable modem is available
- Flexible WM Appliance can be used for other applications such as Internet streaming
- Takes advantage of Internet connectivity
- Can be used behind firewall – HTTP streaming

Disadvantages:

- Typically limited to about 700 Kbps which provides “VCR” quality video/audio
- Requires DSL or Cable modem connectivity to Internet

### Internet with DSL or Cable Modem connection (H.264)

If a high speed network is not available it is possible to use the Internet to deliver the video live from remote locations. At the remote site you would need a cable or DSL modem with at least 500 Kbps upstream bandwidth. A VBrick H.264 encoder appliance can be connected to the video source at the remote location. It then encodes the video and audio into a digital IP stream which is transported over the Internet to the studio where an H.264 decoder appliance (set-top-box) can convert the stream back to analog video. The H.264 appliance preserves the broadcast video/audio quality and can provide up to DVD resolution at 30 fps.



#### Advantages:

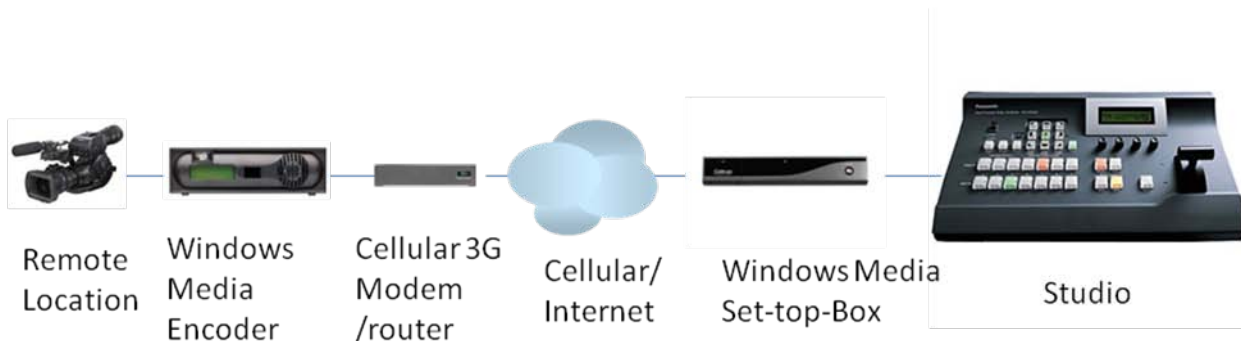
- Can provide up 720 x 480 resolution
- Can be used almost anywhere a DSL or Cable modem is available
- Uses H.264 video compression – latest technology
- Takes advantage of Internet connectivity
- Can provide almost “DVD” quality if 1 Mbps of upstream bandwidth is available

#### Disadvantages:

- Typically limited to about 700 Kbps which provides “VCR” quality video/audio
- Requires DSL or Cable modem connectivity to Internet
- About double the price of a comparable Windows Media solution
- Uses “UDP” data transmission which is more susceptible to network issues, or encoder appliance needs to be on an outside IP address

Wireless Cellular /Internet connectivity (Windows Media)

In situations where a wired connection to the Internet is not available, cellular 3G networks can be used for transporting live video/audio back to the station. A VBrick Windows Media encoder appliance can be instantly connected to the video source at the remote location. It then encodes the video and audio into a digital IP stream which is transported over a cellular modem/router to the Internet and down to the studio where a Windows Media decoder appliance (set-top-box) can convert the stream back to analog video. The typical rate for connectivity via the cellular network is 200 to 500 kbps.



Advantages:

- Great for outdoor events where wired Internet connections are not available
- Can be used in mobile applications – such as in automobiles
- Uses universal Windows Media compression
- Takes advantage of Internet connectivity
- Can also be used in wired applications – scalable
- Optional cellular “bonding” technology available to increase speeds up to 1 Mbps

Disadvantages:

- Typically limited to about 200 Kbps which provides sub “VCR” quality video/audio
- Need to purchase cellular modem and data service from cell provider (e.g. \$40/month)
- Dependent on cell coverage and strength

### Remote Interviews via inPerson Videoconferencing

For live remote interviews the inPerson videoconferencing is perfect. It has a built in camera, battery/AC operation, WiFi or Ethernet network connections and is the size of a paperback book. It provides high quality video and audio with resolutions up to 640 x 480. At the studio the inPerson unit is used to receive the live feed and bring it back to analog video (RCA/composite outputs ). The inPerson conferencing units are easy to use.



#### Advantages:

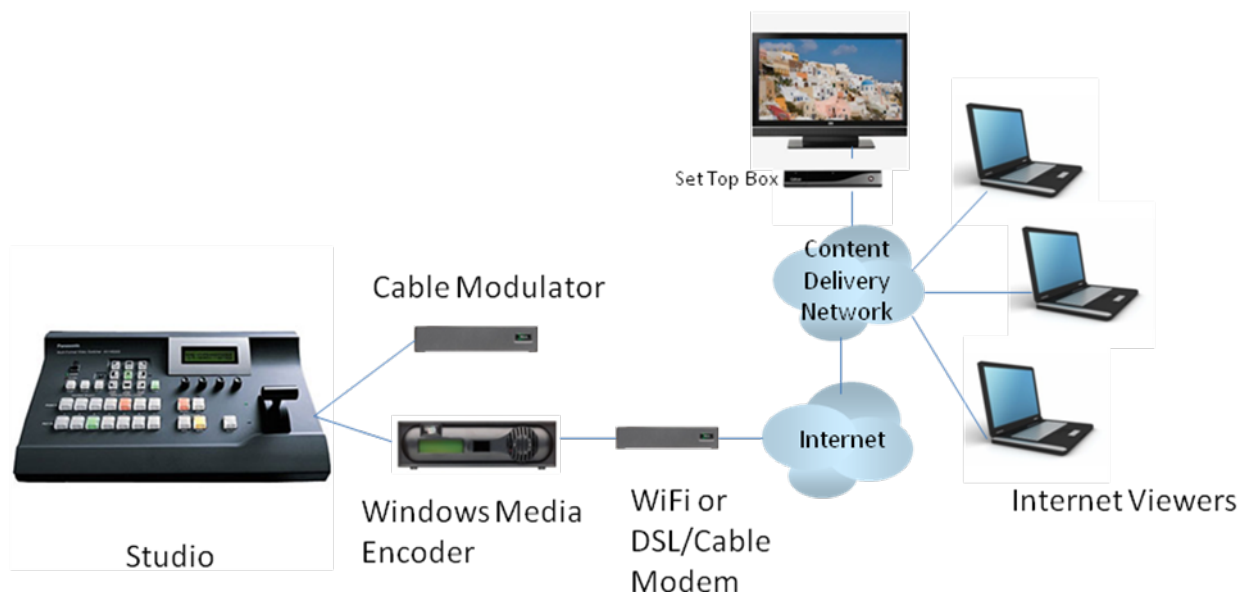
- Great for live remote interviews
- Inexpensive compared to streaming solutions
- Very easy to set-up and use – don't need to be a technician
- Reliable, as opposed to PC-based "webcam" solutions
- No charge, unlimited bandwidth use
- Size of paperback book – very portable
- Can be used on wired or wireless networks
- Battery or AC operation

#### Disadvantages:

- Must use internal camera
- Video optimized for talking heads – not ideal for high motion video

### Webcasting (Windows Media)

Simulcasting your PEG channel on the public Internet is very easy. Simply connect to a VBrick WM Appliance the same audio/video feed you provide to a cable modulator. Viewers may now watch your channel on the public Internet from any Windows or MAC computer. They may also watch your channel on a Set Top Box (decoder) that may be provisioned to view your channel(s).



#### Advantages:

- View your channel anywhere, anytime, even on cell phones
- Attract a younger audience
- Simulcasting is very easy
- Video On Demand optional

#### Disadvantages:

- None