



Technical Information - Understanding Mainstream and Substream - 6/21/17

Our NVRs, DVRs, and IP cameras offer two video streams coming off the cameras. One is called the “**mainstream**” and this is the full, high definition, recorded quality and a second stream, called the “**substream**” which is a stream that uses about 95% less data and is generally around standard definition quality.

The reason the substream exist is for the video to work smoothly over slower local networks or average internet connections, slower devices like phones/tablets, older computers, and/or if you're viewing a lot of camera streams at the same time. **Using the substream does not affect the recorded quality at all as the recorders always records in the high quality mainstream.**

In most cases people are unaware the substream is on, since the full resolution difference may not be noticeable on smaller screens like tablets, phones, laptops, especially when viewing more than one camera at a time.



Mainstream

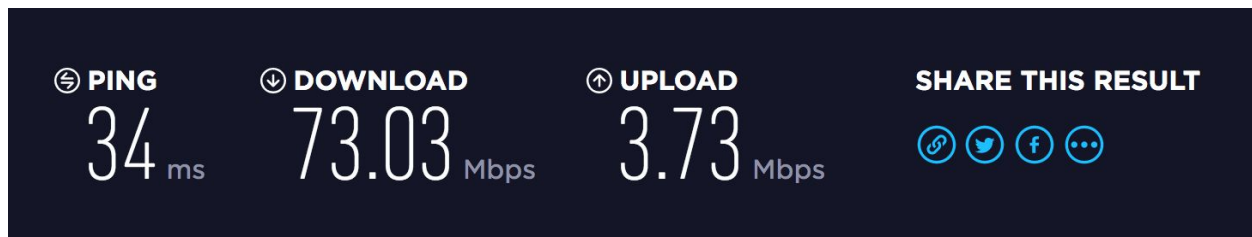


Substream



Close up view

The Internet and Upload Speed



Your internet connection is rated in Megabits per second (Mbps). Most internet providers advertise the download speed, where you download files, websites, etc from the internet to your device. The secondary number, usually in the fine print, is the upload speed, this is where you send things to the internet like uploading photos, video, etc. In most situations your download speed may be 10-20x faster than your upload speed. For example you may see your download speed rated at 60Mbps but 4Mbps upload. You can check your download and upload speeds by going to a speed test website like <http://beta.speedtest.net>

When you're viewing your system over the internet you are **sending** the video over the internet, requiring you to use the less commonly known upload speed. This can cause issues as our high definition cameras use anywhere from 4Mbps for 1080p/30FPS cameras and 16Mbps for 4K and up.

For example, if you had a 4Mbps upload speed and you tried to view 4 cameras in full mainstream quality (16Mbps total) you're likely to experience freezes, slow downs, or no video at all. This is where the substream comes in and allows someone with a 4Mbps upload to theoretically see up to around 16 cameras smoothly on standard substream settings. This is also true for computers or phones which may not have the processing power to handle 16 full HD or beyond HD video streams together.

As a more extreme example someone with just 1Mbps upload could view up to 4 cameras on standard substream settings, even more with reduced substream. If there were no substream the customer would have to reduce the recorded quality to extremely subpar standards or not view remotely at all.

Recommended Bitrates

We recommend the following mainstream and substream bitrates. We do not recommend the substream to be set higher than 512Kbps, people with slower connections may have to reduce bitrate further to ensure smooth remote viewing. Below is a chart of our most popular cameras and their recommended bitrate at the standard frames per second (FPS).

Resolution & FPS	Mainstream Bitrate	Substream
12MP @ 12FPS	12Mbps - 16Mbps	512Kbps Max
4K @ 24FPS	12Mbps - 16Mbps	512Kbps Max
4MP @ 20FPS	6144Kbps (~6Mbps)	512Kbps Max
3MP @ 20FPS	4096Kbps (~4Mbps)	512Kbps Max
1080p/2MP @ 30FPS	4096Kbps (~4Mbps)	512Kbps Max
720p/1MP @ 30FPS	2048Kbps (~2Mbps)	512Kbps Max

Conclusion

If we lived in a perfect world we'd all have 1000Mbps internet and gaming computers to view everything in HD at all times but the reality for most people across the country is much different. The good news is that the substream is still high quality enough to get a great look and most of the time, especially when viewing multiple cameras the quality difference is not always detectable.