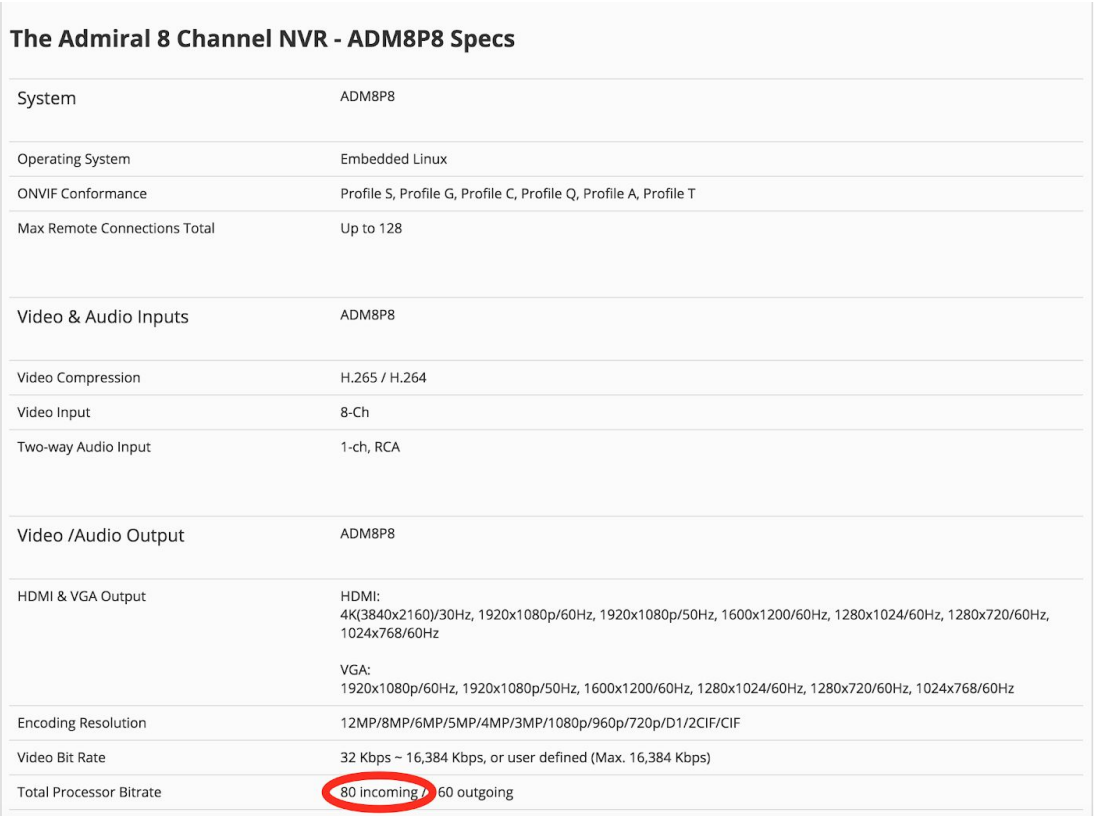
**Technical Bulletin**
8/21/18 - Understanding Bitrate

**Bitrate**

Bitrate is the spec that controls how much compression is on the image. A bitrate too high and you are not only wasting hard drive space but you may also be overloading remote viewing. A bitrate too low and you will be more likely to notice compression artifacts resulting in a blocky image.

## NVR Incoming Bitrate

Each NVR has a specific incoming bitrate in megabits per second (Mbps). In simple terms this means how much data it can take in terms of cameras. Each NVR has the bitrate listed on the specs. The bitrate should always be double checked as changes and upgrades are made over time.



**The Admiral 8 Channel NVR - ADM8P8 Specs**

| | |
|---|---|
| System | ADM8P8 |
| Operating System | Embedded Linux |
| ONVIF Conformance | Profile S, Profile G, Profile C, Profile Q, Profile A, Profile T |
| Max Remote Connections Total | Up to 128 |
| Video & Audio Inputs | ADM8P8 |
| Video Compression | H.265 / H.264 |
| Video Input | 8-Ch |
| Two-way Audio Input | 1-ch, RCA |
| Video /Audio Output | ADM8P8 |
| HDMI & VGA Output | HDMI:<br>4K(3840x2160)/30Hz, 1920x1080p/60Hz, 1920x1080p/50Hz, 1600x1200/60Hz, 1280x1024/60Hz, 1280x720/60Hz, 1024x768/60Hz<br><br>VGA:<br>1920x1080p/60Hz, 1920x1080p/50Hz, 1600x1200/60Hz, 1280x1024/60Hz, 1280x720/60Hz, 1024x768/60Hz |
| Encoding Resolution | 12MP/8MP/6MP/5MP/4MP/3MP/1080p/960p/720p/D1/2CIF/CIF |
| Video Bit Rate | 32 Kbps ~ 16,384 Kbps, or user defined (Max. 16,384 Kbps) |
| Total Processor Bitrate | 80 incoming / 60 outgoing |

NVR Spec section example

NVR incoming bitrate includes both the mainstream and substream coming from the camera. You can not exceed the bitrate or else the NVR may prevent the camera from connecting. If you determine you need a greater bitrate than the recorder offers you will need to either reduce the bitrate used by the camera or purchase a recorder with a larger incoming bitrate.

## Camera Bitrates

Camera bitrates are adjustable and customizable. This list is the standard and default for most of our cameras. This is total, including substream.

H.264

**720p @ 30FPS -** 2.5Mbps
**1080p @ 30FPS -** 5Mbps
**3MP @ 20FPS -** 5Mbps
**3MP @ 30FPS -** 7.5Mbps
**4MP @ 20FPS -** 7.5Mbps
**1080p @ 60FPS -** 8.5Mbps
**4K @ 30FPS -** 10Mbps

**H.265 (Admiral Series)**

**720p @ 30FPS -** 1.5Mbps
**1080p @ 30FPS -** 2.5Mbps
**4MP @ 25FPS -** 3.5Mbps
**4K @ 30FPS -** 5Mbps

## Bitrate Customization

The bit rates listed above are the default and recommended bitrate. In some cases increasing the bitrate may offer a small increase in quality. Most cameras can be adjusted to above, at the cost of the hard drive space as well as the incoming bitrate of the recorder.

If lowering bitrate to increase record time or increase the ability to add more cameras to your recorder, you can typically cut the FPS in half and reduce the bitrate in half.

For example, a 1080p camera at 30FPS would use 5Mbps, but at 1080p at 15FPS it would use about 2.5Mbps.

**Note:** Bitrate must be adjusted manually when adjusting FPS. Bitrate may not automatically adjust with the drop in FPS.

## Outgoing Bitrate

The NVR also mentions an outgoing bitrate. This is the amount of data the NVR can send out to computers for remote viewing.

Another important spec to realize with this is the “Max Connections” typically around 128. Each camera stream being viewed counts as a connection. Another consideration in remote viewing is the decoding capability - for more information refer to our decoding guide.

Determining where the bottleneck for remote viewing is depends on a few factors.

1. **Substream vs Mainstream**

Mainstream is the quality used for recording, so typically that takes up a lot more of the outgoing bitrate. For example, with 1080p at 30FPS the mainstream is about 4Mbps.

So in some cases you may run into the outgoing bandwidth before you run into the NVR’s connection limit.

The substream is a secondary, standard definition stream used to reduce the network load when viewing offsite. The substream typically uses between 256Kbps or 512Kbps. In this case, you may run into the connection limit first.

**2. Upload Speed and Network Speed**

Another potential bottleneck of the recorder is the network speed or upload speed. In most systems (outside of smaller ones) you'll want to ensure the network is running gigabit switches, routers, etc in order to avoid bottlenecks.

In remote viewing, a common source of a bottle before either the Outgoing Bandwith mentioned earlier or Connection Limit is the upload speed of the internet connection. This will depend on your ISP and the package subscribed to. In a lot of cases upload speed may be around 4-5Mbps which means viewing mainstream over the internet may cause slowdowns.

You can determine the total amount of bandwidth use by calculating the camera amounts above.