Nikon 70-200 f/2.8G VR II versus Nikon 70-200 f/4G VR

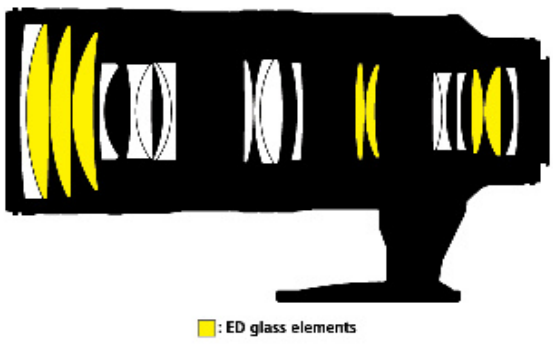
Those that read my newsletters, articles and forum posts on EJPhoto.com, Naturescapes.net or Facebook know that I am always looking for no compromise gear that makes the weight load that I need to carry in the field lower. When Nikon announced the 70-200 f/4G VR lens in October 2012, I decided to get first in line for this lens using my Nikon Professional Services membership and Hunt's Photo and Video sponsorship. The lens, according to Nikon, promises even better image quality than the very good 70-200 f/2.8 VR II lens but at nearly half the weight and in a much smaller form factor. Of course I give up a full stop of light but for landscape photography, where this would be used as my long lens, f/2.8 is relatively unimportant. I would plan to continue to use the 70-200 f/2.8G lens in wildlife situations or situations requiring a fast telephoto zoom. When I was shooting with Canon equipment from 2000 to 2008, I owned both their 70-200 IS f/2.8L and 70-200 f/4L IS lenses and loved the smaller lighter lens as its image quality was equivalent in a much smaller and easier to travel with form factor. The downside to the Canon lens was relatively weak construction for a professional grade lens; it is definitely not a lens you want to knock around very much or risk a complete internal failure and possibly a complete coming apart into two pieces which happened to me at an inopportune time in Iceland. Other than that, it generally made the cut when traveling where the heavier f/2.8 lens did not. So when Nikon finally announced an f/4 pro grade lens in this range, I was elated and eager to try it out.

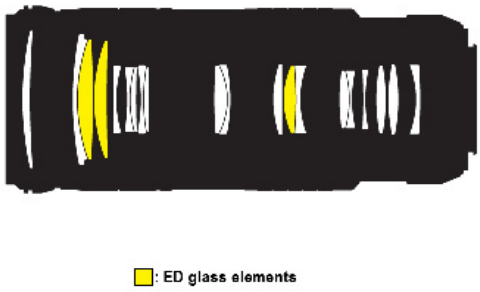
I generally don't like to be first in line for new gear but I felt this to be relatively low risk based on the resolution data from Nikon and the possibility to return the lens if something substantial didn't live up to my expectations. I made plans to do a complete test of the new lens and compare it to the f/2.8 VR II variant. The tests were performed with the Nikon D800E, the highest resolution 35mm DSLR on the market, thereby minimizing any camera contribution to the test results.

Construction:

The very first thing I noticed when pulling the new 70-200 f/4 lens out of the box was the Made in Thailand stamp. While this in itself is nothing to fear since the excellent D300 and D300s camera bodies and most of Nikon's consumer grade product is made in Thailand, this is the first lens that I have owned that does not have Made in Japan stamped on it. The new lens seems to be solidly constructed with a professional finish that looks just like any other pro-grade Nikon lens. The outer barrel is polycarbonate while the f/2.8 lens is metal. This is part of the reason why there is such a stark difference in weight. But the lens looks and feels like a precision professional tool with similar metal mounts and similar nano-crystal lens coatings.

The new lens incorporates three Extra-low Dispersion Glass elements while the f/2.8 lens incorporates 7 of these. The lens element construction diagrams can be compared below:





70-200 f/2.8G VRII

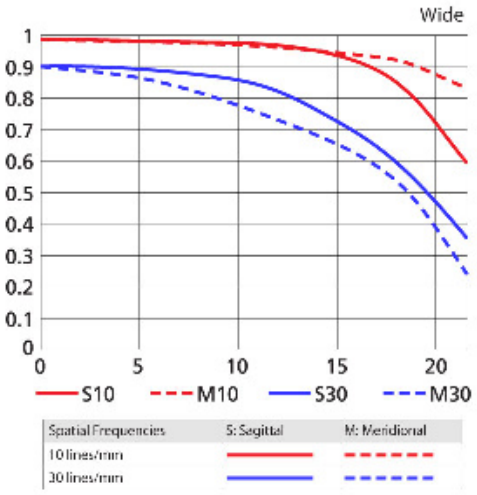
70-200 f/4G VR

As you can see, the optical design of the lenses are very different. The lens collar, which is standard equipment on the f/2.8 lens is an additional and overly expensive purchase on the f/4 lens. For a lens costing $1400, the lens collar should be included!

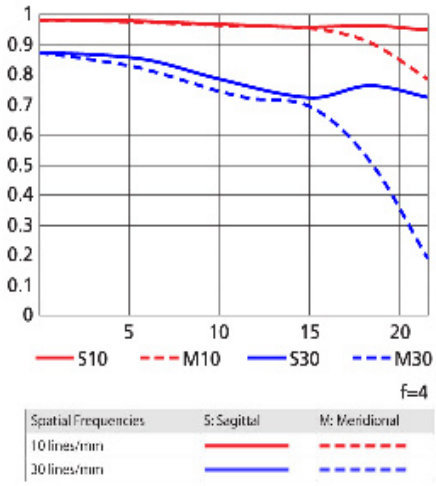
The size difference due to the smaller f/4 aperture and the reduction in weight due to construction materials results in a weight drop from 54.3 oz (1540g) to 30.0 oz (850g). In practical terms this is a drop of over 1.5 lb for the same focal length range and, on paper, equivalent or better image quality.

Sharpness and Resolution:

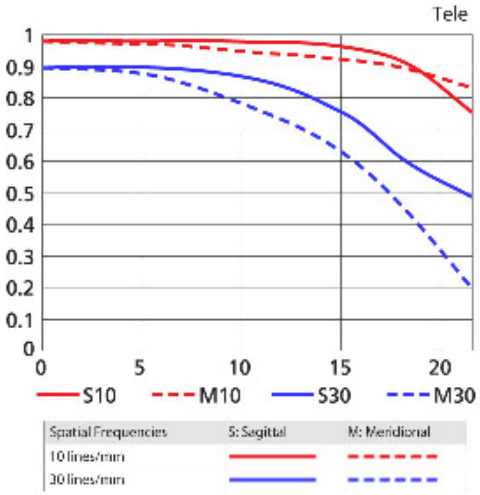
Besides the dramatic weight loss, the thing that attracted me most to the new 70-200 f/4G lens was the published MTF curves by Nikon. On paper the f/4 variant of this lens looks superior to the f/2.8 lens:



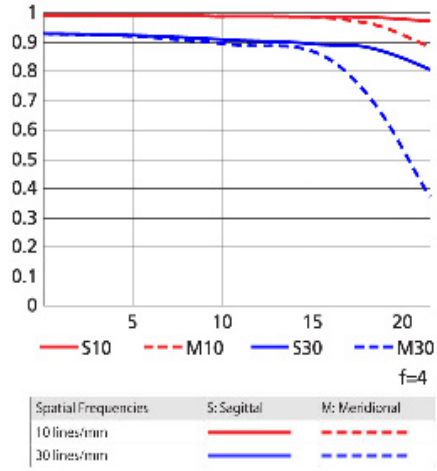
70-200 f/2.8G @ 70mm



70-200 f/4G @ 70mm



70-200 f/2.8G @ 200mm



70-200 f/4G @ 200mm

For detailed information on how to read MTF curves, simply Google the term. In short, on the X-axis, 0 represents the center of the frame and the far right of the graph represents the extreme corner of a full frame (FX) image. The closer the numbers for the different lines on the graph stays at a value of 1 on the Y-axis as you move from center to corner, the more perfect the lens resolution is. As you can see, for both the wide case at 70mm and the long case at 200mm, the new 70-200 f/4G lens has superior performance. The MTF performance on the f/4 lens is truly outstanding for a zoom lens and would even be considered good for a 200mm prime lens.

With the Nikon information as a backdrop, I set out to find if the claims are true and if a difference can be seen using my own ISO 12233 test chart. Looking at the center first, the f/2.8

lens, as expected, had excellent performance resolving approximately 3500 lines per frame at f/2.8. The f/4 lens, however, nearly outresolved the test chart scoring approximately 3750 lines per frame at f/4. When the f/2.8 lens is stopped down to f/4. It's performance is nearly equal to the f/4 lens. The corners were a different story. The f/4 lens loses little resolution in the extreme corners dropping to 3250 lines per frame while the f/2.8 lens drops substantially down to about 2500 lines per frame at f/2.8 and 2750 lines per frame at f/4. So, on the wide end at similar apertures, the two lenses resolution capabilities are indistinguishable in the center of the frame but the new 70-200 f/4G lens has a substantial advantage in the corners.

Moving on to the telephoto end, center performance is again equal at an f/4 aperture and there is a slight drop-off in resolution at f/2.8 on the 70-200 f/2.8G VR II lens. The f/2.8 lens fares much better in the corners at 200mm then it did at 70mm. On the ISO 12233 chart, the two lenses are nearly identical at f/4 and the 70-200 f/2.8G loses about 250 lines per frame of resolution when opening up to f/2.8.

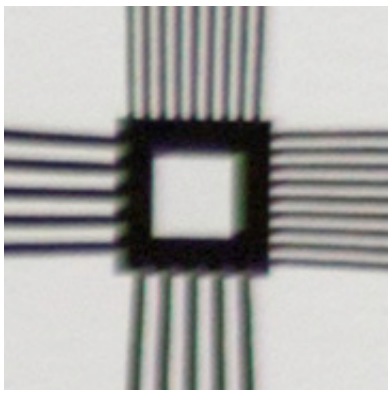
Overall for resolution, the new f/4 lens has a substantial advantage on the wide end for image quality in the corners of the frame and performs equivalent to the f/2.8 lens on the long end.

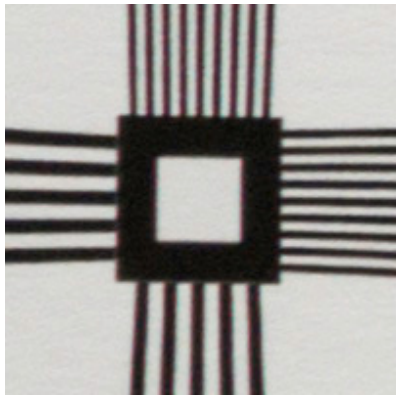
Linear distortions:

At 70mm, both lenses exhibit slight barrel distortion. At 200mm the f/2.8 lens exhibits essentially no linear distortions while the f/4 lens exhibits mild to moderate pincushion distortion. In today's world of automatic distortion correction, this parameter isn't as important as it once was but as of this writing, Adobe Camera Raw, the RAW converter included in Lightroom, Photoshop and Elements is capable of automatically correcting any f/2.8 lens linear distortions but not f/4 lens distortions. While this will undoubtedly change in the coming weeks or months, for the moment, you will need to manually correct any visible linear distortion with the f/4 lens or create your own lens profile with Adobe's Lens Profile Creator.

Chromatic Aberration:

Since the 70-200 f/4G lens only has three ED lens elements while the 70-200 f/2.8G lens has 7, I expected the f/2.8 lens to have a significant advantage in chromatic aberration (CA). However, the tests do not bear this out. While at 200mm, CA was minimal and insignificant with both lenses, at 70mm, the f/4 lens had a large advantage over the f/2.8 lens. The f/2.8 lens has significant color fringing in the corners, especially on vertical lines. Overall then, the f/4 lens is superior for CA. Again, in today's world, CA can largely be corrected in RAW conversion so this is less of a problem then it once was. But since we don't have lens profiles yet for the f/4 lens, it's good to know that CA is not an issue for this lens. The two 100% clips from the corners of the ISO 12233 test chart clearly show the CA difference and the loss of resolution at 70mm on the 70-200 f/2.8G lens mentioned earlier in this review:


70-200 f/2.8 @ 70mm


70-200 f/4 @ 70mm

Vignetting:

The 70-200 f/2.8G has a clear advantage in vignetting at the long end of the zoom range losing 0.7 stops of light in the corner relative to the center while the 70-200 f/4G lens loses a full stop of light. At 70mm, both lenses perform much better from a vignetting standpoint and they are approximately equivalent with a 0.25 stop loss of light. Again, RAW converters can automatically correct for this but it does so by boosting levels in the vignetted areas which can lead to increased image noise in those areas

Auto-focus Response:

As expected, in low light and indoor situations the f/2.8 lens acquires focus much faster and is able to achieve autofocus at a lower level of lighting. This is purely due to the fact that the lens lets in twice as much light since the lens has a full stop larger aperture. In brightly lit and daylight outdoor situation the performance is more equal but there is still an advantage to the f/2.8 lens in initial acquisition. This difference is nearly eliminated if the focus limit switch is used. Repeated focus attempts, switching between infinity and minimum focus, also favors the f/2.8 lens by a small margin. Once a subject is acquired, both lenses are able to track a moving subject accurately with no noticeable difference but erratically moving subjects were not tested.

Vibration Reduction:

The 70-200 f/4G lens has a newer Vibration Reduction (VR) mechanism which is claimed to provide up to 5 stops of vibration reduction while the f/2.8 lens only claims a 4 stop reduction. To test this, 10 hand-held shots with each lens at 1/25 and a 200mm focal length, were taken. Of the 20 total shots taken in total, 7 of the top 10 for sharpness were taken with the new f/4 lens. The remaining three shots with the f/4 lens were in the top 15 slots. The top 5 shots were all taken with the f/4 lens and the bottom 5 shots were all taken with the f/2.8 lens. While it is difficult to distinguish how many stops of light a vibration reduction system really can deal with, it

is clear from these tests that there is an improvement with the new lens. It is also clear that manufacturers inflate the capabilities of their IS systems. I would subjectively rate the VR systems on these two lenses as being capable of reducing vibration by 3 to 3.5 stops of light.

Other Observations:

When the 70-200 f/2.8G VR II lens came out, it was heavily criticized by some due it's staggering loss of focal length as the lens approached minimum focus distance. While doing the testing above, it became immediately obvious that the 70-200 f/4 lens does not suffer from this phenomenon nearly as much, despite having a shorter minimum focus distance. Below is a sample of a picture taken at the f/2.8 lens' minimum focus distance and then the same image taken with the f/4 lens from the same spot. Both images are taken with a zoom setting of 200mm:

As you can see, these two pictures taken from the same spot at 200mm shows how much focal length the f/2.8 lens loses compared to the f/4 lens. The difference is dramatic. Furthermore, when the f/4 lens is then moved to it's minimal focus distance, this is the image at 200mm:

Overall the 70-200 f/4 lens does not lose very much focal length as the focus setting approaches its minimum and since it's minimum focus distance is less, it is capable of significantly larger magnification up close.

Conclusion:

For a lens costing $1000 less than it's bigger f/2.8 brother, the 70-200 f/4G is an incredibly competent performer. It offers outstanding sharpness and resolution from corner to corner and through its full zoom range. For a landscape photographer, its better corner sharpness and lower chromatic aberration makes it an exceptional short to medium telephoto option. Its build quality, while not as tank-like as the f/2.8 lens is excellent and its overall weight and size savings makes it a great travel companion and much easier to hike to backcountry photo-shoots with. It is competent enough to easily handle wildlife but in low light and for maximum auto-focus performance, the f/2.8 lens has an edge. For now, vignetting and any visible linear distortions will have to be dealt with manually but I expect Adobe and other companies to have lens profiles that automatically correct for this in the near future.

This lens will immediately find a home in my landscape lens kit. Saving 1.5 pounds is very welcome, especially since I actually gain corner resolution, something I am always in search of.