Can a Color LaserJet Replace a Monochrome LaserJet?

The topics of this column include a color LaserJet printer as a possible substitute for a monochrome LaserJet; one solution when your Internet connection dies; adventures with a cable modem and a recommendation; some updates on Kaspersky, Bitdefender, and Malwarebytes anti-malware suites; a useful travel accessory; and an interesting digital tape measure.

CAN A COLOR LASERJET REPLACE A MONOCHROME LASERJET?

HP (the company that used to be Hewlett Packard) has long been the standard in laser printers. One of the major reasons is printing quality: when printing typefaces, HP LaserJet printers produce higher-quality output than what comes out of every other comparable printer I’ve looked at, period. There are some important technical reasons for this. First, most monochrome LaserJets have true 1200 dpi resolution in both directions. Many competing laser printers do not actually have that resolution. Second, LaserJets use HP’s proprietary Image Resolution Enhancement Technology (iREt) (later variants of this are called HP FastRes and ProRes). Oversimplifying, this involves the use of spatial filtering and variable dot sizes to improve the detail in both type and images printed on their printers. I analyzed this in some detail, and compared the results to what at the time was their major competitor, in my “Editor’s Comments” in the December 2009 issue of IEEE Antennas and Propagation Magazine. What I wrote then is still true.

Why is such quality important to me? I still deliver final reports and other products to customers in printed form. I am in part judged by the quality of my printed output: it is my product. I also print graphs and maps for applications where the ability to distinguish fine detail can be critical.

I currently use an HP P3015 monochrome LaserJet. The key distinguishing features of this printer are that it prints at about 40 ppm (pages per minute) and its main paper tray has a capacity of at least 500 sheets. Those are still distinguishing features in the current printer marketplace. Printers are grouped around 20 ppm to 25 ppm or 40 ppm to 45 ppm, and they either have a paper tray that takes about 250 sheets or 500 or more sheets of paper. I find that the faster print speed and larger tray capacity make a significant difference in my productivity, and the difference in the initial cost of the printer isn’t that significant. Over several years, the real cost of a printer is the toner. Another important distinguishing feature is the time to print the first page: in these faster, higher-end desktop printers, times of 5.5 s to 7 s are typical, and that is important. The printers rated for lower numbers of pages per minute often also take longer to print the first page.

Such printers with printing speed ratings of 40 ppm to 45 ppm and a main paper-tray capacity of about 500 pages cost about US$650 (with a toner cartridge rated for ~6,000 pages), and their “standard” toner cartridge (rated for ~9,000 pages) costs about US$237. The rated acoustic emission level is 54 dB(A), which is the same as my P3015 (these numbers were taken from specifications for the HP M506 series, but they are similar for several different HP models).

In the past couple of years, HP has perfected color LaserJet printers that cost about the same as the above monochrome printer and have similar specifications. I recently have been reviewing the HP M553n color LaserJet. This led to an interesting question: would it be practical to replace my monochrome LaserJet with a color LaserJet?

The M553n costs about US$600, comes with a black cartridge that prints ~6,000 pages, and with yellow, cyan, and magenta cartridges that print ~5,000 pages. It is a 40 ppm printer,
with a main tray that takes 550 sheets (and has a 100-sheet auxiliary tray). The time to print the first page is between 6 s and 7 s. HP black cartridges (~6,000 pages) cost about US$135; HP color cartridges (~5,000 pages) cost about US$160 each. Higher-capacity cartridges are available at prices that reduce the effective cost-per-page for the color cartridges by about 20%. In other words, the costs associated with the printer and with printing using the color LaserJet are not that much different than with the monochrome LaserJet. Note that there is a “hidden” cost associated with the color LaserJet: it has to have all four cartridges functioning in order to print.

What that means is that if one of the color cartridges gets too low on toner, you can’t print black-and-white output until that color cartridge is replaced. This means that if you want to be prepared to continue printing when you run out of toner, you have to have backups of four cartridges instead of just the one cartridge that is needed with a monochrome LaserJet.

I printed serif and sans-serif alphabets and special characters in font sizes from 4 pt to 16 pt in black on the P3015, and in black, red, and blue on the M553n color LaserJet. I then examined and compared the results under normal reading conditions and under 10x magnification. In all cases—for both printers and for both monochrome and color—the results were visually identical. The 4 pt type was very good. The 6 pt and larger type were visually perfect. These were the same results I obtained from an earlier HP LaserJet in my tests in 2009. The color LaserJet produced print quality that was visually indistinguishable from the monochrome LaserJet.

Color laser-printer technology is not intended to produce photographic-quality prints. A good color inkjet printer is needed for that. However, the M553n did produce very-good-quality color graphics. The color saturation was quite good, the coverage was very good, and the matching of colors from my monitor to the printer was quite acceptable. I’m sure the latter could have been improved had I spent some time going through a calibration procedure. Color charts were quite acceptable. Maps, and prints of such photographs as the satellite views used on Google Maps, were of quite adequate quality. I use such maps in some of my reports (e.g., for antenna siting), and the quality was more than adequate to convey the information needed. In other words, they were very readable and looked quite nice.

The M553n is somewhat larger and quite a bit heavier than the comparable monochrome LaserJet. The color M553n has dimensions of 15.7 in × 18.9 in × 18.0 in (399 mm × 479 mm × 459 mm); the monochrome M506 has dimensions of 16.46 in × 14.80 in × 11.73 in (418 mm × 376 mm × 298 mm). The color M553n weighs 59.6 lb (27 kg); the monochrome M506 weighs 25.9 lb (11.8 kg). However, the M553n will still comfortably fit on a desktop (assuming the desk is adequately sturdy).

All of the above suggested that it would be practical to replace my monochrome LaserJet with a color LaserJet. Unfortunately, that wasn’t the whole story.

The two most significant factors that worked against switching to the color LaserJet were noise and the real time to printing the first page. As noted above, the monochrome LaserJet had a rated acoustic emission level of 54 dB(A), which is a noise level that you wouldn’t notice even if it was sitting on the desk right next to you (which is where my P3015 sits). The color M553n had a rated acoustic emission level of 47 dB(A) (note that these are the sound emission levels when the printer is in the “ready” state, waiting to print). Unfortunately, that most certainly wasn’t what I observed. The M553n I tested was markedly noisier than my P3015. In fact, it was so noisy that when I had it located over six feet (2 m) away from me, I still found it highly objectionable. I would not want to live in a quiet office environment next to the M553n printer. In fairness, when I received the printer it was not packaged well, and it could have sustained damage that was not apparent that might have resulted in abnormally noisy operation. However, the noise was mostly fan noise, and it certainly sounded like the printer was operating as designed. Furthermore, although the rated time to print the first page on the M553n was 6 s (black) to 7 s (color), I experienced times of up to twice that in the course of normal use. That’s too long when you’re just trying to print out a page or two for reference. The M553n would go into a power-saving mode after a few (approximately five) minutes when not in use, and it was almost silent in that mode. Unfortunately, it took even longer to “wake up” from that mode and print the first page than when it was in the noisier standby mode.

In conclusion, I can’t really recommend the M553n color LaserJet as a replacement for a monochrome LaserJet printer, particularly in a quiet office environment. From a cost and quality standpoint, it would be an attractive alternative. However, the noise and the longer time to print the first page ruled it out for my purposes. If someone were to need a color LaserJet in an environment where the printer was being shared among several users (such that you had to walk over to the printer to pick up your output), and the printer was not in a quiet office next to anyone, then the M553n could be well worth considering. 

**WHAT DO YOU DO WHEN YOUR INTERNET CONNECTION GOES DOWN?**

This is in the category of something that if you haven’t thought of, it may be very useful; if you have, skip to the next section.

About once per year my Internet connection dies. Usually, the problem is with my cable Internet provider, and it can take anywhere from a few hours to a
day to get the problem fixed. Given that
my work largely depends on the Internet
(as do my IEEE and URSI responsibil-
ties), that is often too long. If you have
an unlimited or low-cost cellular data
plan and a smartphone, you may have
a quite viable backup Internet connec-
tion at hand. The following instructions
apply for iPhones; search Google with
"using Android phone as hotspot" to
find the very similar instructions for an
Android phone.

On an iPhone, under Settings → Per-
sonal Hotspot, move the slider to “On.”
At this point, you can connect your com-
puter to your phone using either Wi-Fi,
Bluetooth, or a USB cable. Instructions
for making each connection are actu-
al given on the Personal Hotspot page
on the iPhone, along with the Wi-Fi
password. If you have a single computer
to connect and can do so, I recommend
using a USB cable. The charging cable
that came with your phone works fine.
You will probably get a “Trust this com-
puter?” message on your phone when
you plug the phone into the computer’s
USB port. You will need to respond
“Yes” to that. After that, your computer
will probably install a device driver for
the iPhone, and it should then recognize
the network through your phone.

Note that some cellular carriers
charge extra for using a phone as a
hotspot (in addition to data-plan charg-
es), and if you do not have an unlimited
data plan, data charges most certainly
will apply. Data rates will obviously not
be the same as with a high-speed-cable
or fiber-optic connection. However, with
a good 4G connection, they are certainly
adequate to send and receive e-mail, and
to search the Web. You’ll have to experi-
ment to see whether you like the stream-
ing experience.

I do not recommend leaving the Per-
sonal Hotspot feature turned on when
you are not using it.

ADVENTURES WITH A CABLE MODEM
I wrote about the newer cable-modem
standards, DOCSIS 3.0 and DOCSIS
3.1, and cable modems that support
them in my “From the Screen of Stone”
column in the February 2015 issue of
IEEE Antennas and Propagation Maga-
zine. At that time, I had purchased a
Motorola/Arris SURFboard SB6141
modem, supporting DOCSIS 3.0. Not
quite three years later, my Internet con-
nection died. As far as I could tell based
on the front-panel lights on the SB6141
and all other evidence I had, the modem
was operating properly. The only prob-
lem was, it wasn’t. There was no connec-
tivity out of the cable-modem’s Ethernet
port, and substituting another modem
solved the problem. Neither I nor the
cable Internet service provider (ISP)
technician had ever seen a cable modem
that had all indicators working normally,
but wouldn’t pass data!

That meant it was time to buy a new
cable modem. Almost no ISPs in the
United States currently support DOC-
SIS 3.1, but almost all have promised to
do so within the next one to two years.
DOCSIS 3.1 promises a very significant
increase in throughput over DOCSIS
3.0, so it made sense to purchase a cable
modem that was compatible with both
DOCSIS 3.0 and DOCSIS 3.1 (most
cable ISPs currently require DOCSIS
3.0-compatible modems). The first step
in purchasing a cable modem is to con-
sult the list of approved and supported
cable-modem brands and models on
your ISP’s Web site. A given ISP typi-
cally supports only a limited number
of brands and models. Often, cable
modems come combined with Wi-Fi
capability. I had a separate, up-to-date
router with built-in Wi-Fi. I also wanted
to keep the Wi-Fi and cable-modem
functions separate so that I could update
one without having to affect the other.
Of the available DOCSIS 3.1-compat-
bile modems that were just cable
modems, my ISP supported five: Arris/
SURFboard CM8200, Arris/SURFboard
TM3402, Motorola MB8600, Netgear
C7800, and Netgear CM1000.

Based on my admittedly
limited research, I decided
not to choose the Netgear
products. There were a num-
ber of reports of degraded
performance and other prob-
lems with them. The two Arris
modems and the Motorola
modem use the same basic
chip set, and in the tests I
read, they appeared to offer very similar
performance. If you happen to be run-
ning DOCSIS 3.0 and have a router and
an ISP that support channel bonding,
the Motorola modem allows bonding
together four ports, compared to two
with the Arris modems. However, for
me the differentiating factor was that the
Arris modems apparently run much hot-
ter than the Motorola modem. I there-
fore purchased the Motorola MB8600.
It works well and delivers the full rated
upload and download speeds for my
cable Internet connection.

If you need a cable modem, you may
well wish to consider a combination
modem/Wi-Fi/router. That is almost cer-
tainly less expensive than purchasing the
functions separately. However, I think
that it is likely that the available Wi-Fi
technology and implementation of pre-
ferred standards are going to change
more rapidly that will the cable-modem
standards. Of course, most cable ISPs
will gladly rent you a cable modem. You
should look at the economics before mak-
ing the rent-versus-purchase decision. In
most cases I’ve seen, the purchase price
of a cable modem is less than two years’ rent.

REGARDING ANTI-MALWARE SUITES
FROM KASPERSKY, BITDEFENDER,
AND MALWAREBYTES
I wrote about Kaspersky’s anti-malware
suites in the October 2014 and Febru-
ary 2016 issues of IEEE Antennas
and Propagation Magazine, and I also wrote
about Bitdefender’s and Malwarebytes’
software and compatibility issues in the
February 2016 issue. As a very quick
summary (but please go back and read the full
discussion), I preferred Kaspersky’s Total
Security. If, for some reason, that wasn’t
an option, Bitdefender’s Total Security
was also very good. However, I also like
to have Malwarebytes’ Anti-Malware
While my computer has not often been attacked by malware, when it has been, it was Malwarebytes’ Anti-Malware Premium that first detected and neutralized the threat in almost every instance.

A USEFUL TRAVEL ACCESSORY

I travel entirely too much. Because of this, being able to quickly pack and unpack in hotels is an advantage. For decades, I have used a hang-up organizer to carry my underwear, socks, and ties. This organizer has four large, clear, plastic pockets on the front, each with a horizontal zipper. Clean shorts, undershirts, socks, and ties each go into one pocket. The back of the organizer has two large zippered compartments for dirty clothes. When I get to the hotel, all I have to do is hang the organizer up in the closet and most of my clothes are unpacked. When I leave, I put the organizer back into my suitcase and I’m packed. Since I also carry my shirts on hangers, packing and unpacking is very quick.

These organizers used to be commonly available in luggage stores. Luggage stores typically are not appropriate for the distance being measured. These tend to be very rugged. The battery is supposed to last for 64 h of continuous use. It is much easier to read—and to accurately read—an ordinary tape measure.

There is also a Bluetooth version that sends the results of the measurements to a smartphone.

REFERENCES


