![OptiSigns]

Best Practices for Using Raspberry Pi as Digital Signage Player

Raspberry Pi is a popular choice for Digital Signage players, this guide will cover some of the best practices to optimize the Raspberry Pi for performance, minimize issues and reduce maintenance time, cost down the road.

Introduction

Using Raspberry Pi as Digital Signage Player is a solid solution because of the following reasons:

1. Low cost: $35 for the board, and about $60 with cases, and all required accessories.
2. Very reliable: with 14M units sold and many businesses are using it in production for IoT. Raspberry Pi is one of the most reliable device on the market today
3. Easy to use & set up: Just flash an SD card and install OptiSigns and you are ready to go.
4. It can scale to support business large scale deployment. Each model is in production and supports for at least 6-7 years. You can buy large quantities at certified suppliers and expect to be able to have the same model for years to come.

This guide will cover some of the best practices to optimize the Raspberry Pi for performance, minimize issues and reduce maintenance time, cost down the road.

Best Practices for Using Raspberry Pi as Digital Signage Player

Digital Signage is a bit different than normal use cases, as it requires the devices to run 24/7 with potentially pretty heavy load. At a glance, here are all the aspects that you should look at to optimize the Raspberry Pi for Digital Signage:

1. Which model of the Raspberry Pi should I get? 3B+, 4, how much RAM?
2. Thermal: prevent your Pi from overheat
3. Power: make sure you have the right power adapter
4. Storage: get the right SD card for better performance and reliability
5. Network: wall penetration, boost range, or use wired Ethernet
6. Large scale deployment considerations

Good news! We now offer Raspberry Pi
- Pre-configured came fully assembled
- OptiSigns installed, paired to your account.
- You can even set up WiFi beforehand.
- Device setup with all the best practice we recommended
- Shipped to any location, you just need to plug in power and HDMI

Find out more at our [shop](#).

[OptiSigns Pre-configured Raspberry Pi](#)

1) Which model of the Raspberry Pi should I get? 3B+, 4, how much RAM?

In short, we recommend using at least Raspberry Pi 3B+ or Raspberry Pi 4 - 1GB models for better performance, support.

Here's a more detailed comparison, we highlight what's important for Digital Signage use cases for you.

	Raspberry Pi 4	Raspberry Pi 3B+	Notes for Digital Signage use cases
CPU	4-cores A53 @ 1.4GHz	4-cores A72 @ 1.5GHz	-Pi 4 CPU is ~3x faster in raw performance. But for Digital Signage use cases it does not make much difference. -Pi 4 CPU requires more power and generates a lot more heat, and will require a more expensive power adapter and serious cooling.
RAM	1GB, 2GB, 4GB	1GB	-If you are only playing Videos, Images and

			some social, web content, 1GB is enough. -If you have heavy web content like Dashboard such as Tableau, PowerBI you may want more RAM.
Wifi	Dual-band 802.11ac	Dual-band 802.11ac	Pi 4 Wifi performance is actually about 3-4x faster than PI 3. For Digital Signage use cases what's more important is range and reliability over speed. Both model will work well
Ethernet	1 Gigabit	300 Mbps	Pi 4 Ethernet is about 4x faster than Pi. For Digital Signage use cases, we don't need a fast network all the time, so both will work fine.
Video output	2 x Micro HDMI	1 x HDMI	Here's where the Pi 4 has disadvantage, it requires an additional dongle for a few $ to connect to your HDMI cable. Pi 3B+ will work out of the box
USB	2 x USB 3.0 + 2 x USB 2.0	4 x USB 2.0	Pi 4 has USB 3.0, but it's not important unless you are planning to use an external WiFi adapter to boost range.
Bluetooth	Bluetooth 5.0	Bluetooth 5.0	Bluetooth is not important for Digital Signage use cases.
Storage	SD Card slot	SD Card slot	Both can support 256GB+ SD Card
Price & Availability	$35 – 1 GB $45 – 2 GB $55 – 4 GB	$35 – 1 GB	Both models are widely available. 3B+ is still in production and will be supported for a long time.

In conclusion, if you are looking to play simple signage videos, images, some social media, simple screen zoning. Go with Raspberry Pi 3B+, it has an HDMI port, requiring less power, less cooling that will cost you less overall.

If you are looking to display intensive content such as Tableau, Power BI dashboards, more complex screen zoning, the Raspberry Pi 4 will be a better choice.

2) Thermal: prevent your Pi from overheat

If there's only 1 thing you are looking to do to improve performance of your Raspberry Pi as a Digital Signage player, it is to have proper cooling. It is simple but often overlooked. When Raspberry Pi, it will throttle CPU, GPU performance and make the Pi very sluggish, in Digital Signage term, your video will start skipping frames, images transition will start stuttering, etc. Moreover, for Digital Signage use cases, content will keep playing and CPU, GPU will not have time to cool & regain performance.

The best way to reduce overheat is to install a good cooling heatsink. We recommend the Argon Neo Raspberry Pi case. The whole case is made up of high quality aluminum and will act as a huge heatsink. We have tested and at stress performance, the Pi 3B+ & Pi 4 CPU, GPU stabilizes at around 60C and never reach 80C (threshold for throttle)

At $15.00, the price at the time of this writing, it is a very good value. If you buy case & cooling separately it would be close to this price.

Plus the aluminum case is very beautiful (see picture below).

You can buy the Flirc case on Amazon:
[Argon Neo Raspberry Pi 4 Case](#)

OptiSigns is not associated with Argon Neo in any way, we just appreciate the product quality.

Installing a fan can help with thermal management, but for Digital Signage use cases, we don't recommend using a fan, as the devices will be running for an extended period of time and fans will fail, which requires maintenance, replacement.

Other considerations you can do to improve thermal for your Pi:

- Check the ambiance environment, are you planning to run your Pi in a hot place?
- Spacing out heavy loaded content (are you having a few heavy videos playing at the same time on multiple zones?)

3) Power: make sure you have the right power adapter

There are 2 common issues with powering Raspberry Pi: poor power quality and not enough power, which will cause the Raspberry Pi to become unstable.

1 - Low quality power supply:

Even though in theory, you can use any kind of power adapter as long as it output 5V.
In reality, electronic devices that do not have batteries like RPi are more sensitive to voltage, power quality running to the device than say your phone, tablet or power bank that is much more forgiving with power quality as they have batteries.

2 - Not enough power.

Raspberry Pi 3B+ and older use 5V/2.4A, Raspberry Pi 4 uses 5V/3A.
Though, depending on the content you are playing, you may not need the maximum power.
Here's the official power draw table from Raspberry Pi Foundation:

Table: Power draw in Ampere

		Raspberry Pi 1B+	Raspberry Pi 2B	Raspberry Pi 3B	Raspberry Pi Zero	Raspberry Pi 4B
Boot	Max	0.26	0.40	0.75	0.20	0.85
	Avg	0.22	0.22	0.35	0.15	0.7
Idle	Avg	0.20	0.22	0.30	0.10	0.6
Video playback (H.264)	Max	0.30	0.36	0.55	0.23	0.85
	Avg	0.22	0.28	0.33	0.16	0.78
Stress	Max	0.35	0.82	1.34	0.35	1.25
	Avg	0.32	0.75	0.85	0.23	1.2
Halt current				0.10	0.055	0.023

This means, if you only play 1080p video content, a 1A adapter is enough.

If you have USB devices connected and playing more heavy web content, it's better to use a more powerful adapter.

We recommend these adapters:

- For Raspberry Pi 3B+
- For Raspberry Pi 4

4) Storage: get the right SD card for better performance and reliability

Raspberry Pi uses Micro SD card as storage. The good thing is that they are cheap and widely available, but that also means there are so many choices on size, quality, performance.

It's OK just getting the cheapest 8GB or 16GB cards that are averaging $4-$5 each and be done with it. The drawback is, most of these cards are slow, most would average around 10MB/s write and 30MB/s read. Which will make your Raspberry Pi feel a bit sluggish.

Poor quality SD cards could fail easier months down the road and cause you to have to spend time replacing them.

Upgrading an SD Card in this case is similar like upgrading your hard drive from HDD to SSD. The snapiness of your Raspberry Pi will be noticable.

However, you don't have to go crazy with professional grade SD cards that meant for photo, video shooting that would cost way too much.

For Digital Signage use cases, to strike a balance of cost and speed. We recommend these 2 cards:

- [Samsung Evo Select](#)
- [Sandisk Ultra](#)

Price & quality is about the same, ~$8 for 32GB and ~$12 for 64GB. It's just come down to your brand preference.

Regarding size, if you can, recommend 64GB. These cards will have significantly faster write speed (up to 90MB/s compared to 20MB/s of 32GB models).

Finally, you should know that with flash storage like SD Card, the more you fill up storage, the slower the performance will be; so get a larger SD card and avoid filling your device up too full with Digital Signage media content.

5) Network: wall penetration, boost range, or use wired Ethernet

For Digital Signage, the network is an important component, you will rely on the network to get status of the devices, and push new content to them.

Ethernet cable connect would provide best speed and reliability, however in many cases, it's preferable to use Wifi for convenient set up.

Raspberry Pi has a built-in Wifi antenna which is already tuned and putting out maximum signal strength based on certification and regulatory bodies. Raspberry Pi Wifi performance is already pretty good. And while technically it is possible to enhance Raspberry Pi with longer, external antenna, it's not advisable as it will void warranty and potentially cause you to be out of compliance with FCC.

Big metal cases like the Flirc one could impact signal strength as well.

So what can you do to improve Wifi performance?

- Place the Pi in more open space, even if you trying to hide the Pi behind the TV, put it at the top, or bottom edge of the TV instead of directly in the middle of the TV's back.
- Use 2.4g band instead of 5g band, as 2.4g is slower but has better wall, obstacles penetration
- Implement more WiFi Repeater/Access points
- You can use a USB adapter with antenna for a bit better Wifi signal. If you do choose to do so, pick a WiFi adapter that is reported to work with Raspberry Pi out of the box like [this one](#).

6) Large scale deployment considerations

If you are planning for large scale deployment (many screens in many locations), please feel free to reach out to us at info@optisigns.com with more details about your deployment, we can help to advise in more details.

You can use our Pre-configured Raspberry Pi Player, it can be shipped to any location, fully setup, and the person at location only needs to plug in power and HDMI.

Here are some general considerations that you should think about as you planning your deployment:

- If you need a large quantity of Raspberry Pi, you can buy from Raspberry Pi certified supplies in your region like Arrow Electronics in U.S. These suppliers typically have large quantities in stock and provide good service.
- Fully build out a pilot with a couple of Pis that have all accessories (case, power adapters, SD Card) so you specs out exactly what you want to purchase at larger quantity
- Consider building out the Raspberry at your main support, deployment center then ship to locations. Include pairing the screens and assign contents. You can even pre-configure the WiFi connection, so the only thing you need to do at the location is plug the Pi into power and HDMI to the TV.
- Train someone at the local location to help troubleshoot power, internet. They should at least be able to power up the Pi and connect it to the internet, so you can remotely take care of the rest.

Conclusion

Raspberry Pi is a very cost effective and reliable way to implement your Digital Signage solution. This article has walked you through some of the best practices in optimizing your Raspberry Pi for Digital Signage use cases, balancing cost and performance. First, you should avoid overheating by implementing heatsink. Second, make sure you have adequate and reliable power adapters. Third, use a good SD card that will improve performance and reduce chance of failure in the future. Lastly, improve Wifi performance by positioning your Pi in more open space, or revert to 2.4gHz if you need more wall penetration.

Hope this article has helped you in selecting the right components for your Raspberry Pi deployment, and provided some considerations to help your system run smoother and reduce issues in the future.

OptiSigns offers native Raspberry Pi app
that you can just download and run on your Raspberry Pi

Try for free here!