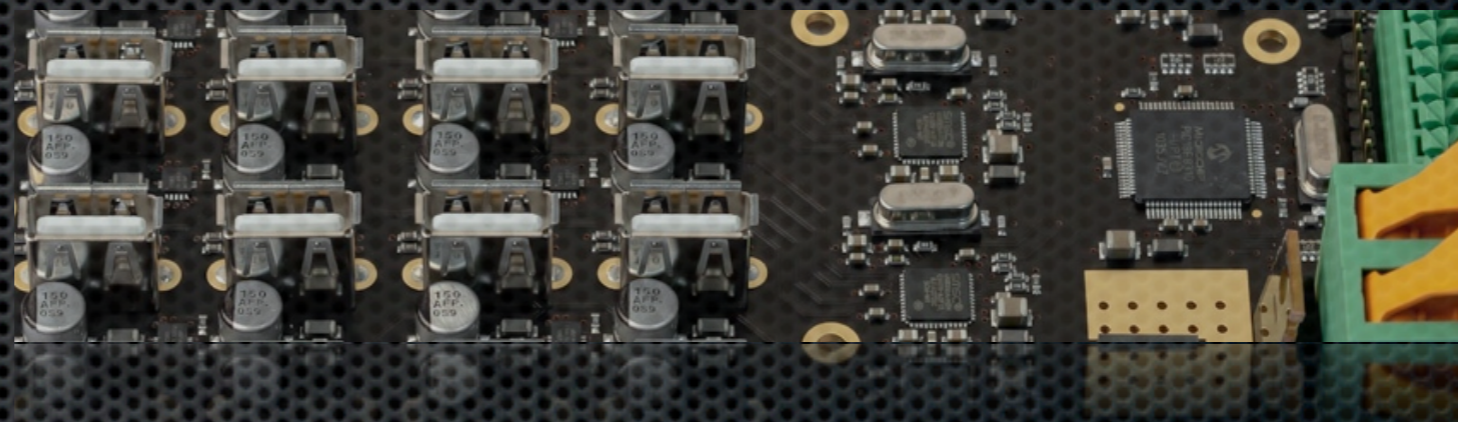


Cambrionix C3

Data transfer



Important notes

- ✦ We characterised 4 iDevices (iPad, iPod Touch and iPod Nano). We then used this characterisation data to estimate the total time taken to sync a 1,000MB file across 16 iPad devices.
- ✦ The sync times quoted don't include other tasks which iTunes performs automatically on connected devices (backup etc). The timer was started when the iTunes progress bar indicated that it had started syncing and was stopped when it stated that it was finished.

Equipment used

- ✦ MacBook Pro. 4GB RAM, 2.4GHz Intel Core 2 Duo.
- ✦ iTunes 10.1.2 with single 1000MB MP3 file in library.
- ✦ Cambrionix C3 setup in 'User Interface' mode.
- ✦ Apple supplied USB-30way cables.
- ✦ 2x iPod Touch running 4.2.1 (8C148) firmware.
- ✦ 1x iPad running 4.2.1 (8C148) firmware.
- ✦ 1x iPod Nano running 1.0.2 firmware.

Sync speeds

Single device

Device	File Size	Time to sync (seconds)
iPad	1,000MB	50
iPod Touch	1,000MB	70
iPod Nano	1,000MB	70

Note: The iPad has improved transfer speed compared to the iPod Touch and Nano but there is not a huge difference.

2x iPod Touch

Device	File Size	Total time to sync (seconds)
2x iPod Touch	1,000MB	70

Note: There is no reduction in sync speed between 1 and 2 devices - the 'iDevices' are the bottleneck.

2x iPod Touch 1x iPad

Device	File Size	Total time to sync (seconds)
2x iPod Touch 1x iPad	1,000MB	70

Note: There is no reduction in sync speed between 1 and 3 devices - the 'iDevices' are the bottleneck.

2x iPod Touch 1x Nano 1x iPad

Device	File Size	Total time to sync (seconds)
2x iPod Touch 1x iPod Nano 1x iPad	1,000MB	100

Note: The time to sync is increased between 3 and 4 devices - the C3 is now the bottleneck.

Why does sync time increase at 4 devices?

USB2.0 offers a bitrate of 480Mbps, if this is divided by the 3 devices (which transfer data at roughly the same rate) we have 160Mbps. If we divide 480Mbps by 4 we have 120Mbps. We can estimate the actual 'iDevice' data rate to be between 120 and 160Mbps - lets assume 140Mbps.

An interface offering less than 140Mbps will be a bottleneck.

Why does sync time increase at 4 devices?

If we take the 480Mbps (USB2.0 theoretical max) and divide this by the 16 ports available on the C3 we have an effective 30Mbps if all 16 ports are used.

We can now take the 140Mbps (17.5MBps) we estimated earlier and divide this by the theoretical max available per port (30Mbps) if all ports are used. This gives us a figure of 4.6.

Why does sync time increase at 4 devices?

The time taken to sync a 1000MB file across 3 devices was 70 seconds. To calculate how long (roughly) it would take to transfer this same file across 16 devices we can multiply this 70 seconds by 4.6 giving us an approximate time of: 322 seconds or 5.3 minutes.

Conclusions

The testing has given us an insight into the actual data rate achievable by the iPod and iPad devices. This data rate appears to be around 140Mbps meaning that USB2.0 will not be a bottleneck until you start to use 4 or more devices simultaneously.

More testing needs to be done to determine the factors which affect sync speed. Factors such as host system spec, filetype, number of files etc need to be investigated.

