**Lesson 2: Introduction and Demonstration of Type-C Concepts**

Hello. I'm Alan Hawse and this is Cypress Academy. Today I'm talking about USB Type-C.

Before getting into the Cypress Type-C solutions, I'd like to take a few minutes to cover Type-C basics starting with the best part, the new cable.

Today's standard USB cables have reached the end of their useful life: they are a bunch of different shapes and sizes; they only carry USB; they can't deliver very much power; you have to plug them in the right way, so this side has to go to this side and that side has to go to that side, and you can't flip the cable around; and they require a big fat ugly connector. I don't know about you guys, but I always take 2 or 3 flips of the cable before I get it plugged in the right way.

The new Type-C cables offer a slimmer, reversible USB connector. Both the connector and the cable are reversible in USB Type-C.

But, the advantages don't stop there. Type-C can not only carry USB signals - both USB 2.0 as well USB 3.1 - it can also deliver up to 100 watts of power and can replace other cables like DisplayPort or Thunderbolt using the "alternate mode". With one cable you can replace this whole mess of cables… how cool is that?

With USB Type-C you can build a system like this. One cable to the wall to provide power for the monitor, which then powers the disk drive and the PC via Type-C. The cable from the PC to the monitor has power, USB as well as display port and the cable from the disk drive has power and USB. No more rats nest of cables behind your computer.

OK, now let's see some of these features in action. I'll start with the CY4531 kit which contains a CCG3 device. You can get this kit and all of its documentation including the schematics and the hardware design files and the software from www.cypress.com/CY4531. Imagine that you want to build a system with USB, Power, and Display Port sent out through a single Type-C connector. In real life all of the components in this kit would be integrated into your system, but for your development purposes we have it broken out into a printed circuit board where you have access to all of the signals to build your tests.

Before connecting the kit, I'm going to verify that the jumpers are set right. J3 is shorting pins 1 – 2 and J4 is shorting pins 2 - 3. All right, good. We have the thing configured correctly.

I'll start out simple – I've connected the kit to an external power source and have connected it to my laptop using a standard USB cable and a DisplayPort cable. Remember in the real world all of these components will be integrated into your product.

Next, I'll plug in a Type-C USB flash drive. This one is cool because it has a Type-C on one side and a Type-A on the other. When I plug it in, it enumerates on the PC just like normal. I can do exactly the same thing with a USB Type-A flash drive by using an adapter card.  This adaptor just breaks out the normal USB lines from the Type-C into an old USB connector.

But, as my 12 year old son would say… "booooorrrrrinnnnggg"  – I am just transferring USB data. Big deal – I can do that without Type-C. Now, let's make it a little more interesting. First, I'll remove the flash drive and instead plug in this Multi-port adapter. It has a Type-C on one side and on the other side has USB Type-C, USB Type-A, as well as HDMI. I'll connect the flash drive to the Type-A port, and connect a monitor to the HDMI port, BAM!  Now I have USB data and video being sent simultaneously through the Type-C cable… how sweet is that!

This is getting better…let's add the power delivery. I'll connect a USB Type-C charger to the multi-port adapter along with the USB as well as the video connections. When I do that, the power role of this kit is swapped and now it's able to receive power from the charger. In fact, I can remove the wall power supply from the kit and everything continues to work exactly as expected.  With Type-C you can CONSUME power or you can PROVIDE power.  You laptop can charge itself from the monitor…or later on you can charge your cellphone from the same Type-C port.

With the CCGx family you can put Type-C carrying USB, video, and power all at the same time into your product. In the next video, I'll show you how to use the CY4500 protocol analyzer to understand a little bit better what's going on inside of the "black box".

As always, you are welcome to email me at [alan_hawse@cypress.com](mailto:alan_hawse@cypress.com) or send me a tweet @askiotexpert with your comments, suggestions, criticisms, and questions. Thank you.