OTTAWA PC NEWS

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ARTICLE

USB 3.0 - The Super-Speed Bus

by Andrew Petrovic

I thought that it would be a good idea to introduce to you a new and upcoming development – the USB (Universal Serial Bus) version 3.0, as this technology will become mainstream in a fairly short time.

USB version 1.0 was created in 1996, but was more widely available in 1998 as version 1.1, superseded by version 2.0 in 2000. Over the next few years this will be replaced by version 3.0, already released and now being used by some consumers.

A quick overview of USB

The reason that USB was created all those years ago was in order to provide an interface for computers and peripheral devices that was easy to set up and use, as well as being low-priced. Actually, the USB data protocols used are very complex, but fortunately the USB controller chips take care of these details, so users don't have to be concerned.

USB is designed to be 'Plug and Play' without the user having to set up parameters such as interrupt requests; addressing; etc; as well as not having to reboot the computer after adding a peripheral.

In USB versions up to 2.0 there are only four wires that are connected: power; ground; data – and data +.

This is the 'A'-type connector usually found on a computer interface or hub:

This is the 'B'-type connector often found on the USB peripheral:

There are various other 'mini' and 'micro' connector types as well.

When we talk about USB components, we call a peripheral that plugs in to a computer port a 'device' and the port and controller associated with the port on the computer is called the 'host'.

Each device has a 'descriptor'. When a device is connected to a computer, the descriptor tells the host what kind of peripheral it is. From the product IDs it provides, the computer then knows what type of driver to load for that device. A driver is a small piece of software that interfaces between a hardware device and the operating system.

Other information passed to the computer includes the device's power requirements; protocol settings; etc.

When a USB device is unplugged, the host instructs the operating system to unload the driver for that device.

As far as the user is concerned, the most important element of the upgrades to the USB technology is the increasing speed of data transfer. The following table shows the differences in data transfer speed between the versions.

The theoretical speed quoted by manufacturers would, in reality, not be possible to achieve and is based upon operations that include extra packet transfer overheads, as well as a few other things. The real life actual maximum speed is likely to be between 30% and 60% of the quoted theoretical speed.

Version 1.1 had two speeds, 'Low' and 'Full'. Version 2.0 just bettered the 1.1 version 'Full' speed.

(Continued on page 3)

Inside this issue:

Next Meeting: WEDNESDAY, February 9th, 2011

February Raffle

Courtesy of the Microsoft MVP program, we have a copy of **Windows 7 Ultimate** for the February raffle. This is the full version (not the "upgrade only" version) that can be installed on any PC. Valued at $350.

If you have not yet moved to Windows 7, and you didn't win the October raffle copy, this is your chance to start using what is widely perceived to be Microsoft's best ever operating system.

Tickets are, as always, a good deal at $1 for one, a great deal at $2 for three or the unbelievable bargain of $5 for ten!

January Prize Winners

Harold McClemens was the winner of the raffle at our January general meeting.
We know he will enjoy his copy of Corel VideoStudio Pro X2.

Thanks to Corel for the prize donation. As always it is much appreciated.

Coming Up…

February 9th, 2011

Speaker: Bob Walker, Facilities Chair for the OPCUG

Topic: Web 2.0 Enterprise Social Networking

- Why web 2.0 social networking is different for business and government than it is for you and I
- Why they should do it anyway
- Some major alternatives
- Some general information on 'Cloud Computing' and 'Web 3.0'

2011 CALENDAR

Meetings	Date	Time and Venue
OPCUG General Meeting	Wednesday, February 9th	7:30 p.m. Auditorium of the **Canada Museum of Science and Technology**, 1867 St. Laurent Blvd. http://www.sciencetech.technomuses.ca/english/index.cfm
Beginners' SIG	Wednesday, February 9th	Immediately following the OPCUG General Meeting.
Linux / Open Source SIG	Wednesday, February 9th	Immediately following the OPCUG General Meeting.
Beer BOF (Wing SIG East)	Wednesday, February 9th	10:00 p.m. (after all other SIGs) at Liam Maguire's, St. Laurent Blvd. at Innes Rd.

Please note that unless otherwise noted, SIGs meet at 9:00 p.m. (immediately following the OPCUG General Meeting).

USB 3.0... *(Continued from page 1)*

USB version	Design ation	Theoretical maximum speed
1.0	"Low speed"	1.5 Mbps = 190 KBps
1.1	"Full speed"	12 Mbps = 1.5 MBps
2.0	"High speed"	480 Mbps = 60 MBps
3.0	"Super speed"	4.8 Gbps = 600 MBps

Note the difference between Mbps (Mega bits per second) and MBps (Mega bytes per second). There are 8 bits in one byte, so when comparing speeds take note of which terminology you are using.

Limitations of USB 2.0

So if USB 3.0 is appearing on the market, it must be because previous versions are not able to do the job. Well, this is partly true. Version 2.0 will be able to be used for quite a lot of devices for a while, but as peripherals get faster and require faster interfaces, so USB 3.0 will become more desirable to end users.

The sort of devices that are likely to require the faster data transfer speeds are external USB disk drives and components that deal with video.

It's not just speed that is a limit. Each USB 2.0 host port can provide up to ½ Amp (500 mA) of current to power a device that does not have its own additional power supply. Often this is simply not enough. Some external disk drives may require up to 900 mA of startup current and that is why they are often supplied with a 'Y' cable that plugs into two USB ports in order to feed enough power (for those portable drives that don't use an external power supply).

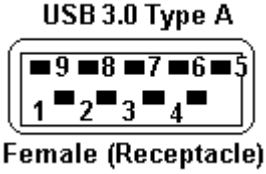
USB 2.0 data only moves unidirectionally. In other words, data can be sent to a device or from a device but not both at the same time. This cuts down the overall speed attainable.

Introducing USB 3.0

Whereas the upgrade from USB 1.1 to USB 2.0 used the same connectors with the same four wires, the upgrade from USB 2.0 to 3.0 is very much different.

Take the USB 2.0 configuration and add another entire set of connectors to it and call it 'Super speed'. This is how USB 3.0 has been created. The original USB 2.0 wires are still in place and the USB 3.0 adds five more wires (two pairs of data wires and a signal ground cable).

This is how the 'A'-type looks, with pins 1 to 4 being identical to the original USB 2.0 specification:



Cables and connectors are backwards compatible as well, so you can plug in a USB 2.0 device to a USB 3.0 port – you just won't get any extra speed advantages because only the USB 2.0 connectors will be used, though the power pins are the same so more available current should be available for USB 2.0 devices.

How is USB 3.0 better?

Apart from being fully compatible with previous USB versions, the faster data transfer is quite a dramatic improvement for USB 3.0 compatible devices because of a faster clock control speed; the use of asynchronous signalling for simultaneous sending and receiving; and an interrupt mechanism that does not use the time-consuming polling that USB 2.0 used.

One area where USB 3.0 may fall down is with the length of the cable that can be used. It could be limited to 3 metres if high throughput devices are used, as compared to the 5 metre cables possible with USB 2.0.

The limitation could be overcome using USB hubs or extenders and perhaps fibre-optic cabling might be possible in the future.

Is it worth upgrading?

USB 2.0 will likely be around for the next few years anyway, but in time newer computer motherboards will provide USB 3.0 ports as standard.

If you want to try out the technology now, there are add-on adapters available that plug in to a spare PCI -Express slot on your PC and provide two or more USB ports. There are also a few USB 3.0 external disk drives available, as well as hard drive enclosures with USB 3.0 interfaces where you can put in your own internal drive.

If you only have slow devices on your USB connections, it's no great advantage to upgrade. For example, keyboards and mice only require the slowest USB version and will not work any better on faster USB ports.

If you must have the faster transfer speeds for storage or video devices, then you should consider some form of upgrade. There are alternate interface types, such as eSATA and FireWire, but they are a less common interface type than USB and they also require a separate power line, as well as not always being 'hot-swappable'.

(Continued on page 6)

TREASURER'S REPORT

Ottawa PC Users' Group, Inc.
3 Thatcher Street
Ottawa, ON K2G 1S6
Web Site: http://opcug.ca

Balance Sheet, 2010

Assets

Current Assets

1000	Cash Account (TDCT)	1,979.92
1100	Investment Account (ING)	20,573.64
1200	Membership float	40.00
Total Assets		**22,593.56**

Equity

Owner Equity

OPCUG, Capital December 31, 2009	21,727.72
Total revenue	5,033.85
Total expenses	4,168.01
Net income	**865.84**
OPCUG, Capital December 31, 2010	22,593.56
Total Equity	**22,593.56**

TREASURER'S REPORT

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Income Statement, 2010

Revenue		2010 ($)	2009 ($)
2100	Bank Interest (ING)	227.10	307.53
2200	Membership Income	3,150.00	2,925.00
2300	Raffle Income	1,656.75	1,342.95
2400	Merchandise Income	0.00	0.00
2500	Workshop Income	0.00	0.00
2900	Miscellaneous Income	0.00	0.00
	Total revenue	**5,033.85**	**4,575.48**

Expenses

3100	PUB II Expense	974.01	1,246.72
3200	Newsletter Expense	2,071.00	1,923.09
3300	Office Supplies Expense	166.44	34.30
3400	Bank Charges	59.40	59.40
3500	Barbecue Expense	697.16	409.17
3600	Facility Rental	200.00	200.00
3700	Workshop Expense	0.00	0.00
3800	Merchandise Expense	0.00	0.00
3900	Miscellaneous Expense	0.00	0.00
	Total operating expenses	**4,168.01**	**3,872.68**
	Net income	865.84	702.80

OTTAWA PC NEWS

Ottawa PC News is the newsletter of the Ottawa PC Users' Group (OPCUG), and is published monthly except in July and August. The opinions expressed in this newsletter may not necessarily represent the views of the club or its members.

Member participation is encouraged. If you would like to contribute an article to Ottawa PC News, please submit it to the newsletter editor (contact info below). Deadline for submissions is three Sundays before the next General Meeting.

Group Meetings

OPCUG meets on the second Wednesday in the month, except July and August, at the Canada Museum of Science and Technology, 1867 St. Laurent Blvd, Ottawa. Meetings are 7:30–9:00 p.m. and Special Interest Groups (SIGs) go until 10 p.m.

OPCUG Membership Fees: $25 per year

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USB 3.0... *(Continued from page 3)*

Other things that will benefit from the USB 3.0 interfaces are card readers and connections from digital cameras, when transferring pictures to the PC, though not when you plug in the current 'slower' devices. USB 3.0 thumb drives will be faster on a USB 3.0 interface but the current USB 2.0 thumb drives will be no faster on a USB 3.0 port. Interestingly enough, USB 3.0 thumb drives will be faster on existing USB 2.0 ports because the whole USB 3.0 flash drives had to be redesigned with faster chip access in order to take advantage of the USB 3.0 port speed.

Later versions of Windows and Linux should natively support USB 3.0 at some point. Windows XP will not, but USB interface and peripheral manufacturers should be able to supply suitable drivers for XP systems.

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Reduce, Reuse, Recycle

Bring your old computer books, software, hardware, and paraphernalia you want to GIVE AWAY to the General Meetings, and leave them at the table near the auditorium's entrance. Please limit magazines to publication dates of less than two years old.

You may TAKE AWAY any items of use to you.

Any items left over at the end of the meeting have to be taken back home by those who brought them in.