What is usb smart charging



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I"ve noticed lately lots of claims from producers of USB battery packs that their ports are "smart" and "identify the device" to "deliver the maximum current for the device." A cursory look into the matter seems to imply that this isn"t completely marketing language, and there is actually something more complicated going on.

Not understanding the subtle chemistry of lithium-ion batteries or the nature of charge controllers, I would guess that to charge a battery as quickly as possible, you would draw as much current as possible, limiting it only to the battery specs. This must not be the case, since it is documented that devices limit their charging to 1A in some cases, when surely they could draw more. Why is this?

If the current draw is so controlled, what's going on with these smart ports to enable the device to draw more current? From a product page for an Anker battery, they claim their ports identify the device and "speak its unique charging language" (that phrasing makes me nauseous). Maybe I shouldn't react so harshly to that phrasing though - are the USB data lines actually used to negotiate some charging pattern?

Edit: Sometimes the manufacturer doesn't follow the standard and uses something proprietary. Sometimes the "something proprietary" would be to just let the data pins hanging in the air or at a certain voltage and then provide an arbitrary amount of current...

That's because regular ("dumb") wall chargers use USB's data connections to signal in a static, analog way what they are capable of. "Smart" chargers can do the same, but in a less static way: they watch the behaviour of the charging device, and deduct from that the ideal setup -- which they can then emulate.

Examples of dedicated charge port controller chips are the Texas Instruments TPS2510 series "USB Charging Port Controller", Maxim MAX14600 series "USB Host Charger Identification/Adapter Emulator" and Norelsys NS3601 "USB Fast Charging Port Controller".

Different chargeable devices require different kinds of chargers. This is partly because the USB specification did not specify "charging" behaviour initially, and partially because some manufacturers want their devices to only charge at their quickest on their own wall plugs. Also, a device may not draw more current than what it can assume to be allowed, to avoid the risk of overheating an incorrectly designed power source.

The chip manufacturers don't really describe how their "detection" logic works, but the only option they have is to monitor what the charging device is doing on the D+ and D- lines, and to look at the current that is being drawn.

One technique which might be used, is to cycle through the emulated states and noting the amount of current

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that is drawn. The state with the highest current draw then is the "best" and remains active.

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