

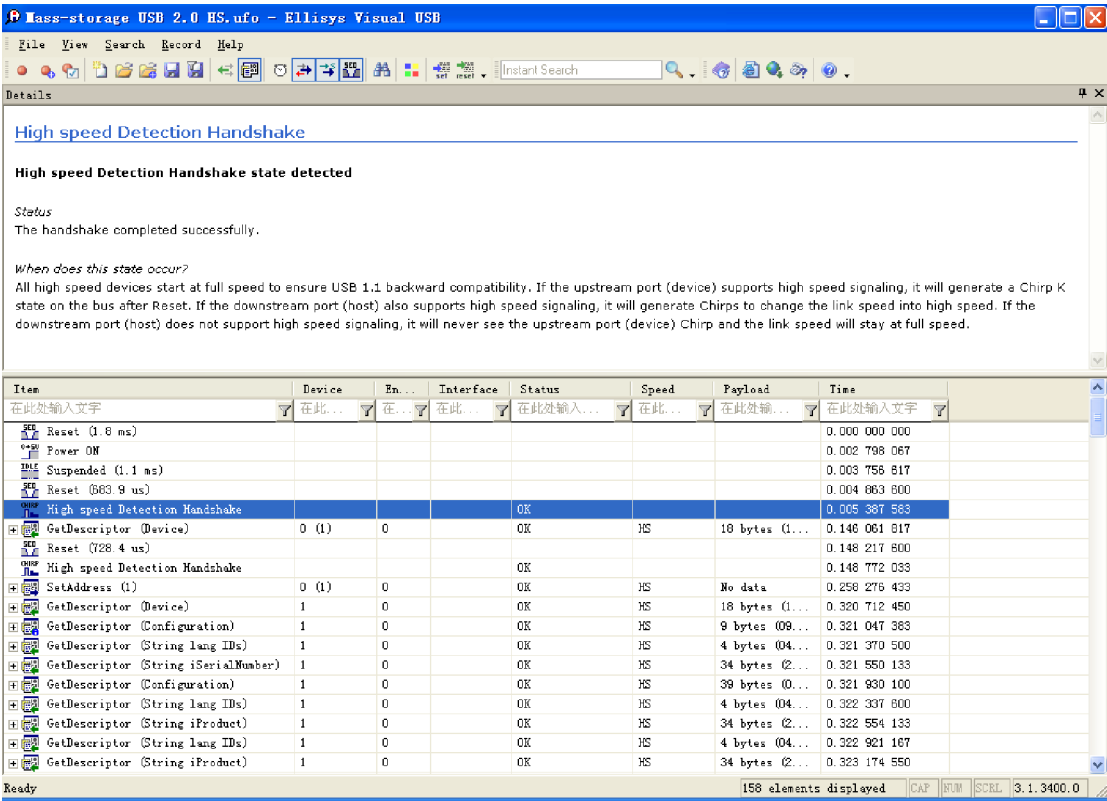
关于 USB 高速（HighSpeed）和中速(FullSpeed)的区分

USB 中区分当前设备是低速还是中速(初始时, 高速也被当做中速)的方法是检查 D+ 或者 D- 上的电阻。如果发现是中速设备, 还要有额外的动作来区分是中速还是高速设备。具体的做法是:

“主机识别一个中速设备是否支持高速。要知道一个设备是否支持高速, 需使用两个特殊的信号状态。在 Chirp J 状态时只有 D+线会被驱动, 在 Chirp K 状态时只有 D-线会被驱动。

在重置期间, 支持高速的设备会送出一个 Chirp K。高速的集线器检测到该 Chirp 后, 会反映遗传的交替 Chirp K 与 J。当设备检测到 KJKJKJ 的样式后, 它会移除它的中速上升, 然后在高速执行所有的通信。如果集线器没有对设备的 Chirp K 做出相应, 设备知道它必须继续使用中速通信。高速的设备必须能够在中速时, 相应检测设备的请求”【注释 1】

使用 Ellisys USB 分析仪查看, 其中的一个例子: Mass-storage USB 2.0 HS.ufo 可以看到这样一个握手。



High speed Detection Handshake

High speed Detection Handshake state detected

Status
The handshake completed successfully.

When does this state occur?
All high speed devices start at full speed to ensure USB 1.1 backward compatibility. If the upstream port (device) supports high speed signaling, it will generate a Chirp K state on the bus after Reset. If the downstream port (host) also supports high speed signaling, it will generate Chirps to change the link speed into high speed. If the downstream port (host) does not support high speed signaling, it will never see the upstream port (device) Chirp and the link speed will stay at full speed.

Item	Device	En...	Interface	Status	Speed	Payload	Time
在此处输入文字	在此...	在此...	在此...	在此处输入...	在此...	在此处输入...	在此处输入文字
Reset (1.8 ms)							0.000 000 000
Power ON							0.002 798 067
Suspended (1.1 ms)							0.003 758 817
Reset (683.9 us)							0.004 063 600
High speed Detection Handshake				OK			0.005 387 583
GetDescriptor (Device)	0 (1)	0		OK	HS	18 bytes (1...	0.146 061 817
Reset (728.4 us)							0.148 217 800
High speed Detection Handshake				OK			0.148 772 033
SetAddress (1)	0 (1)	0		OK	HS	No data	0.258 276 433
GetDescriptor (Device)	1	0		OK	HS	18 bytes (1...	0.320 712 450
GetDescriptor (Configuration)	1	0		OK	HS	9 bytes (09...	0.321 047 383
GetDescriptor (String lang IDs)	1	0		OK	HS	4 bytes (04...	0.321 370 500
GetDescriptor (String iSerialNumber)	1	0		OK	HS	34 bytes (2...	0.321 550 133
GetDescriptor (Configuration)	1	0		OK	HS	39 bytes (0...	0.321 930 100
GetDescriptor (String lang IDs)	1	0		OK	HS	4 bytes (04...	0.322 337 600
GetDescriptor (String iProduct)	1	0		OK	HS	34 bytes (2...	0.322 554 133
GetDescriptor (String lang IDs)	1	0		OK	HS	4 bytes (04...	0.322 921 167
GetDescriptor (String iProduct)	1	0		OK	HS	34 bytes (2...	0.323 174 550

Ready 158 elements displayed CAP INUM SCRL 3.1.3400.0

上面的解释是

“ High speed Detection Handshake
High speed Detection Handshake state detected

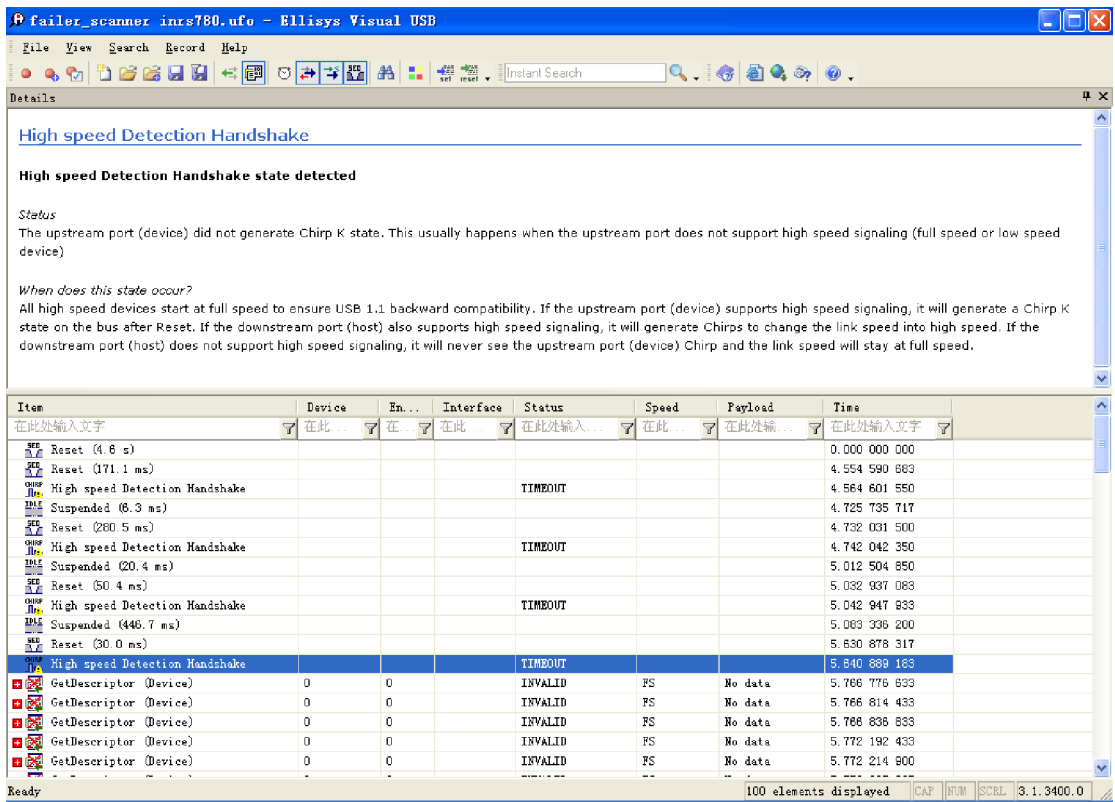
Status
The handshake completed successfully.

When does this state occur?
All high speed devices start at full speed to ensure USB 1.1 backward compatibility. If the upstream port

(device) supports high speed signaling, it will generate a Chirp K state on the bus after Reset. If the downstream port (host) also supports high speed signaling, it will generate Chirps to change the link speed into high speed. If the downstream port (host) does not support high speed signaling, it will never see the upstream port (device) Chirp and the link speed will stay at full speed.”

可惜的是无法看清楚具体的电气特性。

这里还有一个 Failed 的情况：



主机多次尝试握手设备，不但没有相应，反而后面看起来将设备“握手死了”，以至于无法相应后面的 GetDescriptor 命令... ..设备是 Datalogic Quickscan L 2330 条码枪。

上方文字解释是

“High speed Detection Handshake

High speed Detection Handshake state detected

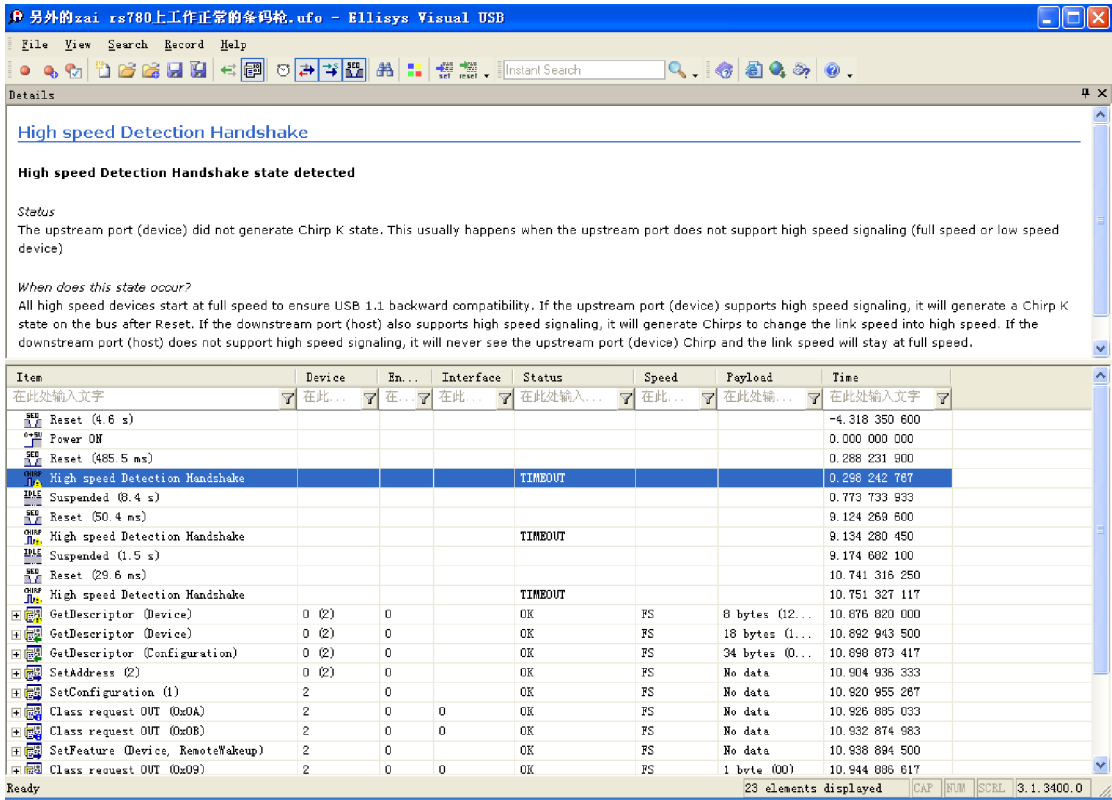
Status

The upstream port (device) did not generate Chirp K state. This usually happens when the upstream port does not support high speed signaling (full speed or low speed device)

When does this state occur?

All high speed devices start at full speed to ensure USB 1.1 backward compatibility. If the upstream port (device) supports high speed signaling, it will generate a Chirp K state on the bus after Reset. If the downstream port (host) also supports high speed signaling, it will generate Chirps to change the link speed into high speed. If the downstream port (host) does not support high speed signaling, it will never see the upstream port (device) Chirp and the link speed will stay at full speed.

”



上面是一个工作正常的条码枪（同样的主机平台），可以看到，主机握手三次，然后放弃了，后面还能正常工作。

注释 1：来自 USB2.0 硬件设计（第二版） P57 第 3 章 检测设备 萧世文 宋延清 编著 清华大学出版

参考： Ellisys Visual USB Analysis Software Version 3.1.3400.0 32-bit edition