Application Note:

TSP100 Virtual Serial Port Emulator

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1. Introduction

Star Micronics' Virtual Serial Port Emulator (VPE) allows users running older POS Software only supporting serial communication to enjoy the benefits of using a TSP100 Printer with a modern USB or Ethernet interface. This solution brings the convenience of these faster communication methods without requiring any change to the POS Application in use. Additionally, this feature provides support for Star Micronics' ETB Status Command in Star Line Mode.

This document explains VPE functionality and provides methodology for software developers wishing to implement such a solution into their applications.

2. Supported Products and Environments

TSP100 futurePRNT Ver5.1.0

■ Printer

Supported Printers:
TSP100ECO (USB) * Stop printing: Disable under F/W ver.2.0 or later
TSP100U (USB)
TSP100PUSB (Powered USB)
TSP100GT (USB) * Stop printing: Disable under F/W ver.2.0 or later
TSP100LAN (Ethernet) * only ESC/POS Mode

Supported Emulations:
ESC/POS Mode
Star Line Mode

■ Host PC

Supported OS:
Microsoft Windows 7 (32-bit/64-bit)
Microsoft Windows Vista Service Pack 2 or later (32-bit/64-bit)
Microsoft Windows XP Service Pack 3 (32-bit)

3. Supported Programming Environments

- Win32API   : C
- .NET Framework 2.0 or later   : C#

Sample programs are available for both of the above environments. Reference Section 8 (Sample Programs).
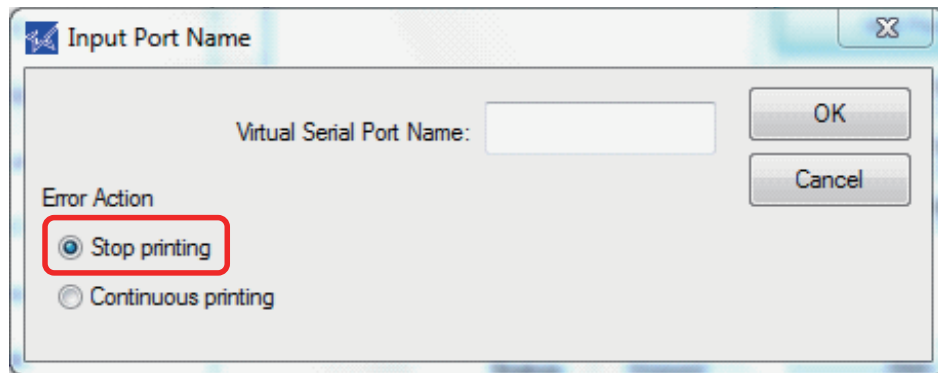
4. futurePRNT Utility Settings

Prerequisite: Prior to making the changes listed in this section, a Virtual Serial Port must be created in the futurePRNT Configuration Utility in either ESC/POS or Star Line Mode. Refer to the TSP100 Software Manual for directions on creating the virtual serial port.

Note: The following information applies ONLY to the TSP100GT(F/W ver.2.0 or later) and TSP100ECO(F/W ver.2.0 or later) in Star Line Mode.

Depending on the firmware version, the futurePRNT Utility might result in an error when attempting to use the VPE. To remedy this, follow these directions:
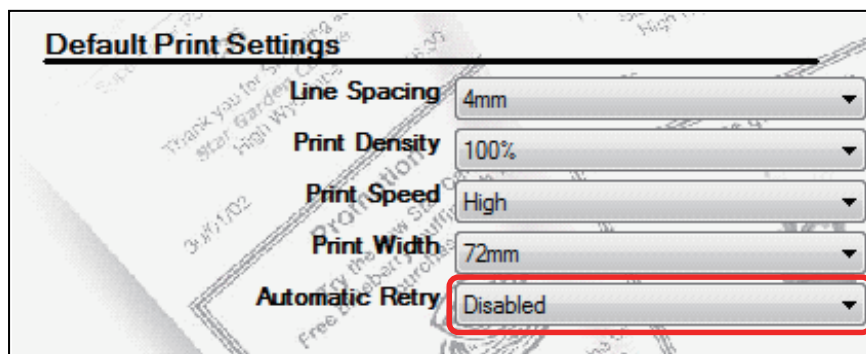
1. Click "Stop Printing" and then the "OK" button.

2. Click on the "General Settings" tab and locate the "Automatic Retry" dropdown box.

3. Set Automatic Retry to "Disabled" and click on "Apply Changes" at the bottom.

The default setting of each model is as follows:

· TSP100GT : Disabled
· TSP100ECO : Enabled
· TSP100U : Enabled

5. List of Supported APIs

The VPE supports the following APIs:

5.1　Win32 API

○ : Supported
△ : Supported (Limitation)
× : No Support

Category	Win32 API	Status	Notes
Universal API	CreateFile	○	
	WriteFile	○	If an error occurs while data is being sent, the VPE sets the fourth parameter (written bytes amount) to 0; in comparison, a physical serial port would set this parameter to the total amount of bytes sent.
	WriteFileEx	○	
	ReadFile	○	
	ReadFileEx	○	
	CloseHandle	○	
Serial Port Control API	BuildCommDCB	○	
	BuildCommDCBAndTimeouts	○	
	ClearCommBreak	×	This always returns TRUE, even though it is not supported.
	ClearCommError	○	Physical errors (framing, parity, etc.) are not caused by the virtual port.
	CommConfigDialog	○	
	EscapeCommFunction	×	This always returns TRUE, even though it is not supported.
	GetCommConfig	○	
	GetCommMask	○	
	GetCommModemStatus	○	
	GetCommProperties	○	
	GetCommState	○	
	GetCommTimeouts	○	
	GetDefaultCommConfig	○	
	PurgeComm	○	
	SetCommBreak	×	This always returns TRUE, even though it is not supported.
	SetCommConfig	○	
	SetCommMask	○	
	SetCommState	△	VPE does not support the following settings: - Software flow control - Data bits without 8-bits data - Special characters
	SetCommTimeouts	△	The VPE and actual serial port handle this function differently. To learn more, reference the PDF named "Timeout Status Differences".
	SetDefaultCommConfig	○	
	SetupComm	○	
	TransmitCommChar	×	This always returns TRUE, even though it is not supported.
	WaitCommEvent	△	Supports EV_CTS, EV_DSR, EV_RXCHAR and EV_TXEMPTY.

Above: Supported functions of Win32 API

5.2 .NET Framework

Supported Class: System.IO.Ports.SerialPort

○ : Supported
△ : Supported (Limitation)
× : No Support

Category	.NET Framework	Status	Notes
Properties	BaudRate	○	
	BreakState	×	This always returns TRUE, even though it is not supported.
	BytesToRead	○	
	BytesToWrite	○	
	CtsHolding	○	
	DataBits	△	Must be fixed 8-bits data.
	DiscardNull	×	This always returns TRUE, even though it is not supported.
	DsrHolding	○	
	DtrEnable	○	
	Handshake	○	TSP100LAN Only: It will take 80 seconds for the application to recover from an error if this method is called when the printer is powered off.
	IsOpen	○	
	NewLine	○	
	Parity	○	
	ParityReplace	○	A parity error is not caused by the virtual port.
	PortName	○	
	ReadBufferSize	○	
	ReadTimeout	○	
	ReceivedBytesThreshold	○	
	RtsEnable	○	
	StopBits	○	
	WriteBufferSize	○	
	WriteTimeout	○	
Methods	Close	○	
	DiscardInBuffer	○	
	DiscardOutBuffer	○	
	Dispose	○	
	GetPortNames	○	
	Open	○	
	Read	○	
	ReadByte	○	
	ReadChar	○	
	ReadExisting	○	
	ReadLine	○	
	ReadTo	○	
	Write	○	
	WriteLine	○	
Events	DataReceived	○	
	Disposed	○	
	ErrorReceived	○	Physical errors are not caused by the virtual port.
	PinChanged	○	

Above: Supported Status of .NET Framework
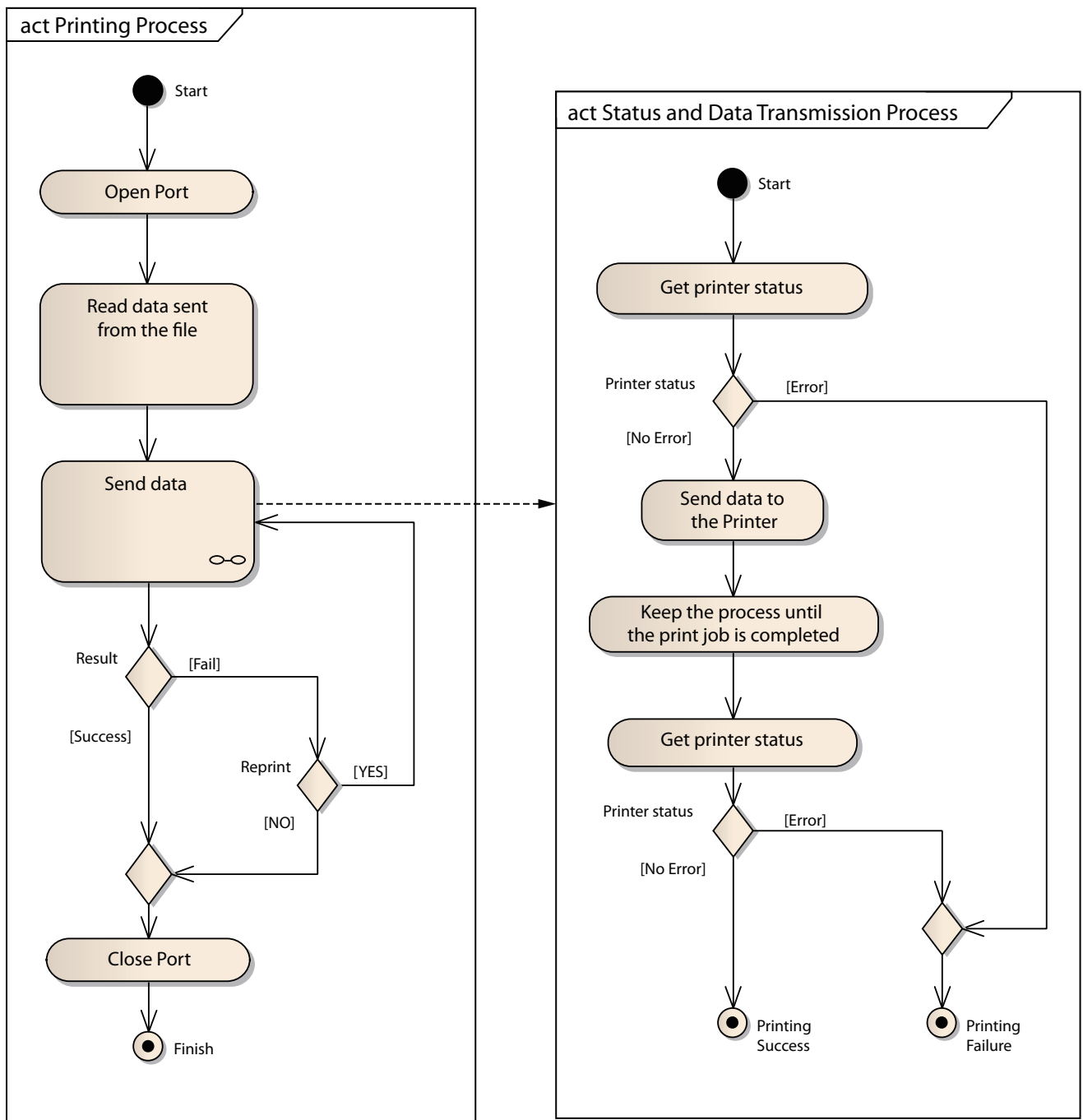
6. Limitations and Considerations

- If an error occurs while sending a print job, the data will be lost. Retry sending the print job from the application.

- Send all data as one document, not by bytes or lines. Sending data in pieces can result in slower print speed.

- ESC/POS Mode: The application is unable to check if the print job was finished.

- The VPE and actual serial port handle this function differently. To learn more, reference the PDF named "Timeout Status Differences".

7. Flow of Data Processing

7.1 ESC/POS Mode

It is advisable to confirm if the printer's status is set to online before and after sending a print job in ESC/POS Mode.

For details of printer status, refer to the "ESC/POS Mode Command Specification" manual available on the Star Micronics website.

act Printing Process

Start → Open Port → Read data sent from the file → Send data

Result: [Success] / [Fail]

Reprint: [YES] / [NO]

Close Port → Finish

act Status and Data Transmission Process

Start → Get printer status

Printer status: [No Error] / [Error]

Send data to the Printer → Keep the process until the print job is completed → Get printer status

Printer status: [No Error] / [Error]

Printing Success / Printing Failure

7.2. Star Line Mode

In Star Line Mode, it is possible to confirm if a print job was completed by using the ETB Status Command. For details of both printer status and the ETB command, refer to the "Star Line Mode Command Specification" manual on the Star Micronics website.
* If using the TSP100GT or TSP100ECO, choose "Stop Printing" in the VPE Utility; refer to Section 4 of this document for more information.
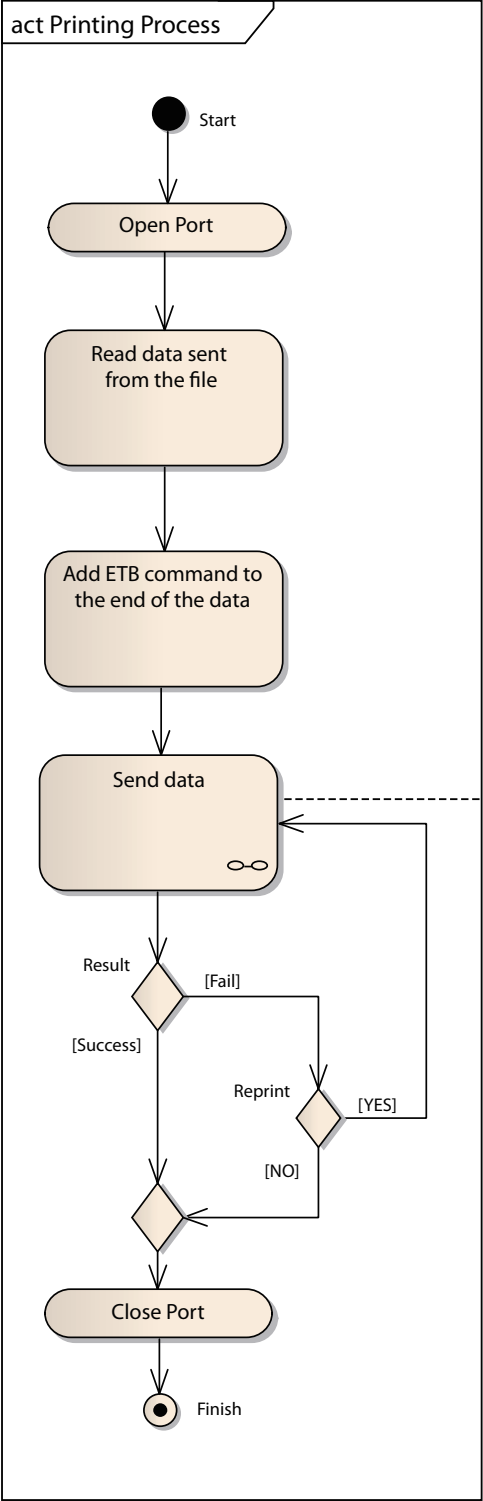
[Procedure]

(1) Create and enable a Virtual Serial Port.

(2) Send the status request command via the VPE to ensure the printer is online. Additionally, check the ETB counter.

(3) Add ETB(0x17) to the end of any print data and then send the print job via the VPE.

(4) Send the status request command via the VPE. Then, confirm the status. Repeat this step until the status is changed to one of the following:
[1]: Success; ETB counter increases by 1, [2]: Printer Error, [3]: Time-out after results [1] and [2] (*1)

(5) The following chart explains the status information returned by steps 2 and 4 of this procedure:

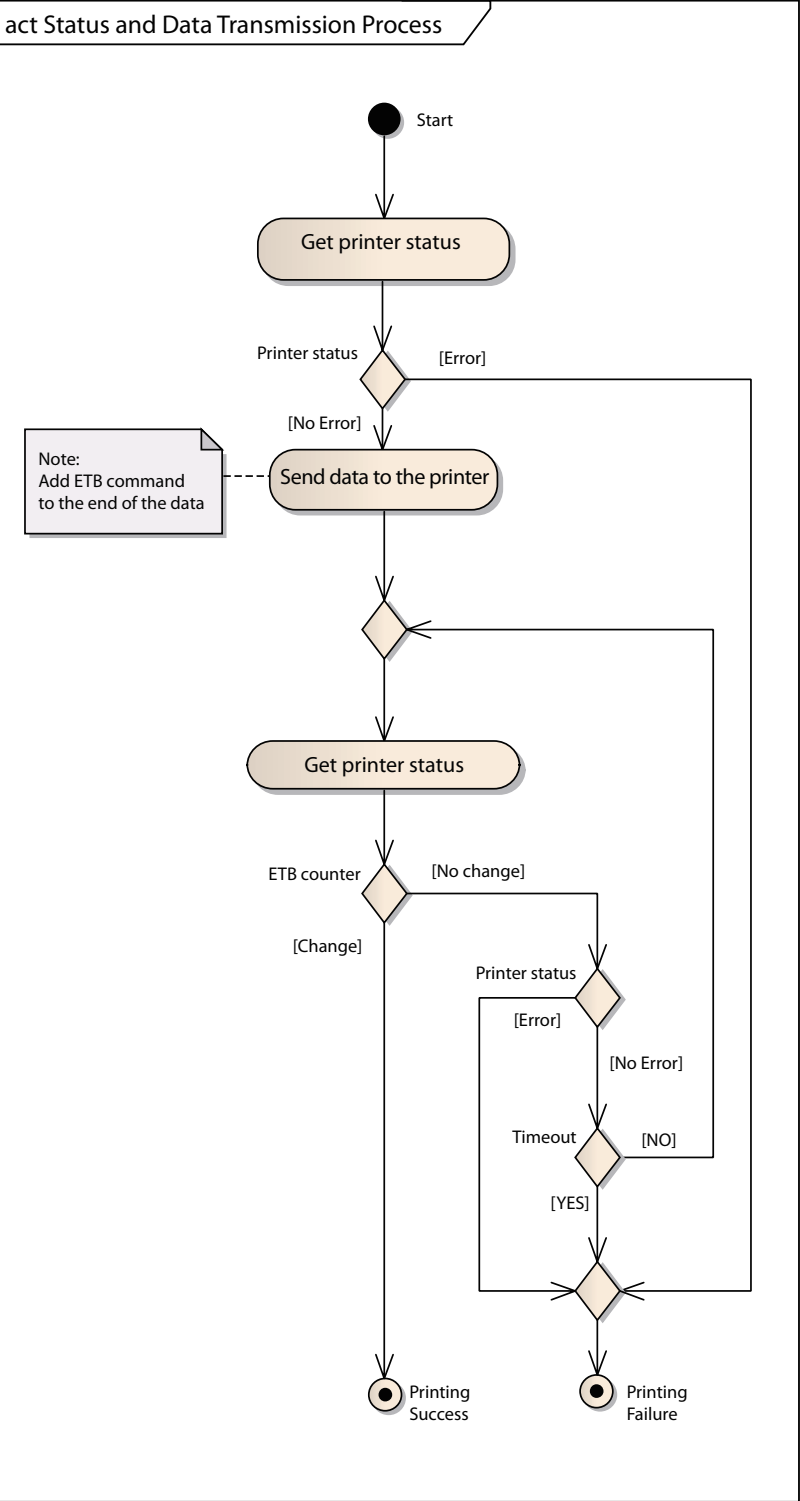| Printer Status	Action
ETB Counter Increased by 1	Data was successfully printed
ETB Counter Increased by 1 + Hardware Error Occurred	Data was successfully printed even though a printer error occurred. Identify the hardware error (ex: Paper Low) and avoid it when sending the next print job
ETB Counter Not Increased + Hardware Error Occurred	Data failed to print. Ensure the printer is online and resend the print job.
Time-out after results [1] and [2] (*1)	Data failed to print. Ensure the printer is online and resend the print job. This could occur if the printer recovers immediately from error status (*2)

Above: Explanation of status returned by the printer

(*1) Time-out periods will vary depending on size and type of print data sent. The Star Micronics sample program is set 5 seconds.
Ensure the time is set to a longer value than just finishing the print job; consider the amount of time necessary to cut paper or pop a cash drawer.

(*2) This situation could occur when the printer detects an error and recovers it immediately while simutaneously getting status (Step 4).
A time-out happens in this situation because the printer clears all remaining data sent to it, including the ETB command which is added at the end of print job. The printer then returns to its online status and the process continues until the ETB counter increases. Since the ETB counter doesn't increase, the printer times out waiting for it to do so.
In the sample program, the repetition interval is set 500 miliseconds to get status. Change the value depending on the application's requirements.

8. Sample Programs

The sample programs* mentioned in Section 7, "Flow of Data Processing", are stored in the following location:

Note: "D:\" is the drive letter of CD-ROM

[ESC/POS Mode]
D:\Windows\SDK\VirtualSerialPort\TSP100_VPE_ESC_POS_Sample_20110308.zip

[Star Line Mode]
D:\Windows\SDK\VirtualSerialPort\TSP100_VPE_StarLineMode_Sample_20110308.zip

* These samples were written in Microsoft Visual Studio 2005.

9. References

These links are for reference only and are subject to change without notice:

[MSDN Library] Serial Port Class
http://msdn.microsoft.com/en-us/library/system.io.ports.serialport.aspx

10. Release History

Rev. No.	Date	Contents
Rev. 1.0	Mar. 2011	Document Created
Rev. 1.1	May. 2011	Updated the List of Supported APIs due to new version release