LM TECHNOLOGIES®

DTR-DSR and RTS-CTS lines difference document

Document Version: 1.0

Contents

1 Introduction

This document describes the difference between DTR/DSR handshaking and RTS/CTS flow control in context of LM Technologies Serial Adapters – LM048, LM048SPA and LM058

Abbreviations

LMT: LM Technologies
DTR: Data Terminal Ready
DSR: Data Set Ready
RTS: Request to Send
CTS: Clear to Send
POS: Point of Sale
EPOS: Electronic Point of Sale
SPA: Serial Printer Adapter

2 RS232 Interface

2.1 Pin-out
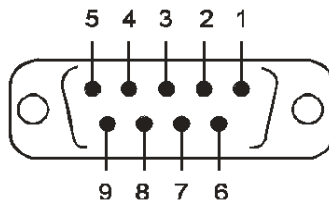
2.2 Signals

| Pin	DTE Signal	DTE to DCE Direction	DCE to DTE Direction
1	CD (Carried Detect)	Input	Output
2	RxD (Receive)	Input	Output
3	TxD (Transmit)	Output	Input
4	DTR (Data Terminal Ready)	Output	Input
5	GND (Ground)	N/A	N/A
6	DSR (Data Set Ready)	Input	Output
7	RTS (Request to Send)	Output	Input
8	CTS (Clear to Send)	Input	Output
9	Vcc (Input Voltage)	Input	Input

3   Setup

This section explains different setups which can be done using our adapters in different configurations. Only the relevant lines are shown for simplification purpose. In reality all RS232 signals are used. A dotted line means wireless connection. The direction of lines (input/output) is shown via arrows.

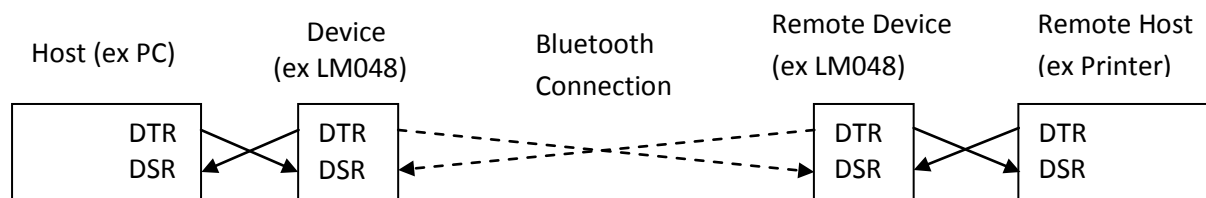## 3.1   DTR DSR Handshaking – No Hardware flow control

The first diagram shows the conventional connection between two devices using RS232 cable. The second diagram shows the equivalent of 1st diagram using a pair of serial adapters.

**With Serial Cable**
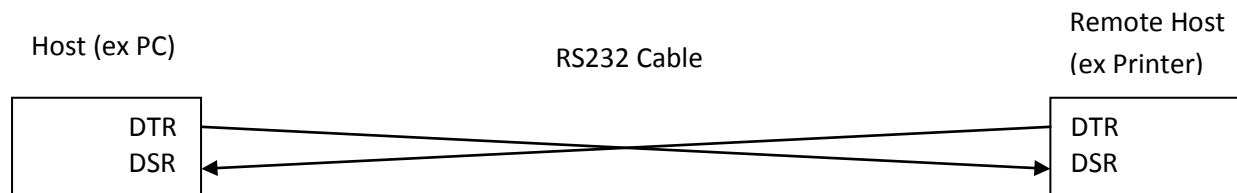
With Adapters

DTR-DSR lines are crossed between the host and device on both local and remote side. DTR DSR line status is transmitted wirelessly across adapters (shown by dotted lines).

3.2   RTS CTS flow control – Hardware flow control

DTR DSR handshaking is not used in this case. The RTS CTS hardware is always local between an adapter and host to which it is connected.
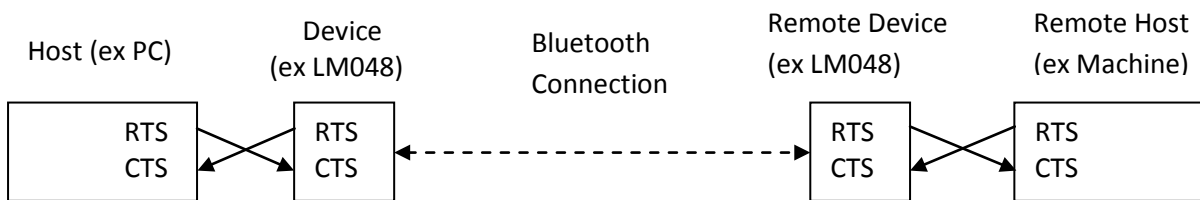
With Serial Cable
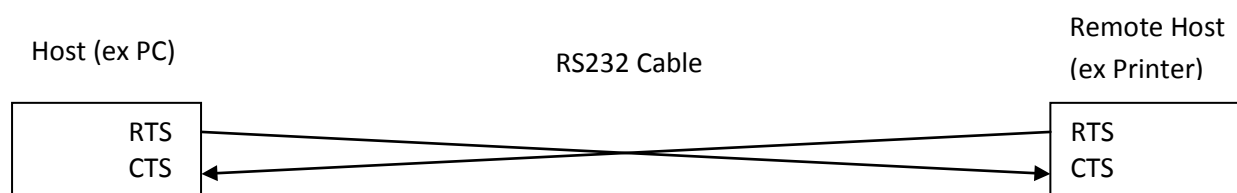
With Adapters

In case of adapters the flow control exists only between the adapter and host to which the adapter is connected. The 2 adapters are connected via a Bluetooth connection. To prevent data loss over the air, Bluetooth flow control is used. So if the receiving adapter is unable to receive any more data, it will tell the sending adapter via Bluetooth protocol. The sending adapter will as a result tell its host to stop sending data by asserting its RTS line low.

No RS232 signals are transmitted wirelessly.

| Host (ex PC)	Device (ex LM048)	Bluetooth Connection	Remote Device (ex LM048)	Remote Host (ex Machine)
RTS CTS	RTS CTS		RTS CTS	RTS CTS

3.3 RTS CTS and DTR DSR handshaking – No Hardware flow control

In this case the hardware flow control is disabled. The status of all the RS232 control lines (RTS, CTS, DTR, DSR) is transmitted wirelessly to the remote side. It is up to the application using this configuration to use the DTR DSR lines or RTS CTS lines for handshaking. This configuration is useful for printers which use RTS CTS lines for handshaking and ignore the DTR DSR lines.

 For printers that use DTR DSR lines for handshaking, the configuration is Section 3.1 can be used.

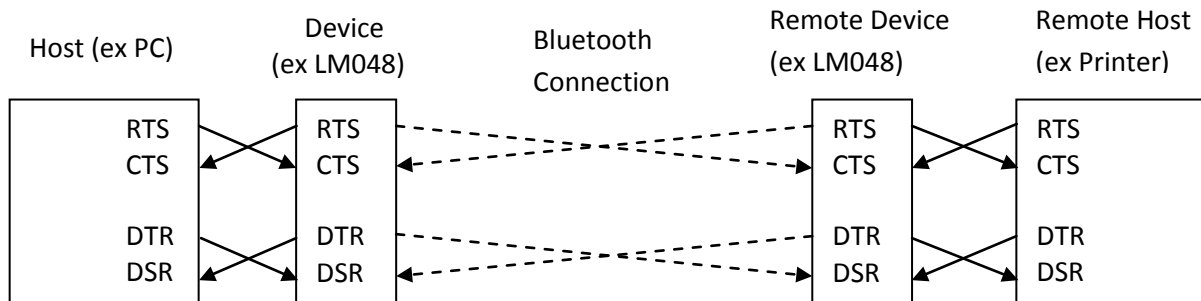The 1st diagram shows this case with a serial cable. The 2nd diagram shows the equivalent with LMT Serial adapters.

With Serial Cable

Host (ex PC)	RS232 Cable	Remote Host (ex Printer)
RTS CTS DTR DSR		RTS CTS DTR DSR
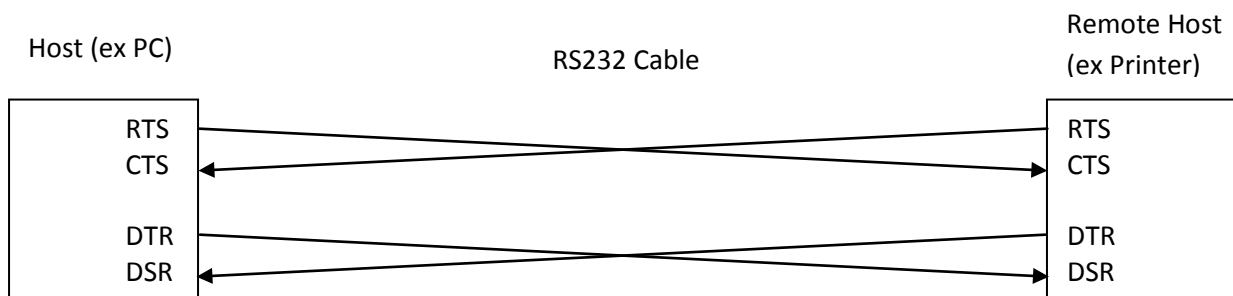
With Adapters

DTR, DSR, RTS, CTS signal status is transmitted wirelessly to the remote side when the Bluetooth is connected.

4 Differences

Please note DTR/DSR lines have multiple purposes depending on the application. For example these lines can be used for handshaking, flow control or even providing power to the unit. However RTS/CTS lines are mostly used for data flow control between the host and device. The below description has been written in context of LM Technologies Serial Adapters. The description is true in most of the cases but for some applications these descriptions may not hold true. Also the below descriptions may not be true for some other applications where LM Technologies Adapters are not used. Users are advised to use this document as a guide only and also check their own application to see if the below description holds true in their case.

Device and Host

In the context of this document, the device is the LMT Serial Adapter and Host can be a PC or other device to which the adapter is connected.

	DTR/DSR	RTS/CTS
Connections	DTR (Host) <-> DSR (Device) DSR (Host) <-> DTR (Device)	RTS (Host) <-> CTS (Device) CTS (Host) <-> RTS (Device)
Direction	DTR: Output DSR: Input	RTS: Output CTS: Input
Purpose	Handshaking signals – The host asserts to DTR line to tell the device that it is up and running. The host de-asserts its DTR lines in case of any error.[1]	Flow Control Signals - If hardware flow control is enabled, the host and the device always check the status on these lines before sending the data. If the CTS line is high only then the data is sent. When the device or host is ready to receive data, it asserts RTS line high.[1]
Driven by?	**These lines are driven by the firmware in the adapters**. The adapter asserts its DTR line as soon as there is an active Bluetooth connection. The DTR line is de-	When hardware flow control is enabled, **these lines are controlled by hardware**. Firmware has no control over these lines. When hardware flow control is disabled, these lines are either not used or used by firmware in the

	asserted (driven low), when Bluetooth connection drops or there is an error condition on the remote side eg "Power Failure on Remote Host", "Out of Paper in Printer".	exact way as DTR DSR line depending on the configuration of adapters. The RTS CTS lines are used as DTR DSR line to cover the printers which use RTS CTS lines for handshaking instead of DTR DSR lines
Buffering	There is no buffering when using DTR DSR handshaking	The hardware does buffering when using hardware flow control
Applications	POS, EPOS, Printers	Industrial, Healthcare, Academic, Vending, Domestic, General Serial Communication

5   References

1. http://en.wikipedia.org/wiki/Flow_control