Technology
Solutions (UK) Ltd

COMMANDING THE 1128 USING AN ANDROID *BLUETOOTH*® TERMINAL APPLICATION

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Design • Development • Manufacture

TERMS & CONDITIONS

CONTENT

History

Version	Date	Modifications
1.0	18/06/2013	Document Creation

INTRODUCTION

This document provides an introduction to commanding the Technology Solutions' 1128 UHF *Bluetooth*® Reader using an Android device. It provides a step-by-step guide to pairing the 1128 using the *Bluetooth*® Settings and a set of command examples demonstrating the power and flexibility of the TSL ASCII protocol 2.0.

Full documentation for the TSL ASCII protocol 2.0 can be found here (registration required):

http://www.tsl.uk.com/1128-downloads/

It is important to note that this document is not a transponder tutorial and users should have a basic understanding of UHF Class 1 Gen 2 transponders.

The latest UHF Class 1 Gen 2 Standard is available for download from:

http://www.gs1.org/gsmp/kc/epcglobal/uhfc1g2

These instructions were created using a 10" tablet device running Android 4.0.3 (ICS) but the 1128 Reader can be used with any device using Android 2.3.3 (Gingerbread) or later.

All the examples in this document were tested using S2 Terminal for *Bluetooth*® Free (see Figure 1 – top row, middle) available from the Google Play Store here:

https://play.google.com/store/apps/details?id=jp.side2.apps.btterm

Note: This is an Ad-supported terminal program however the Ads have been removed from any screenshots in this document. Use of this program is for illustrative purposes and does not represent an endorsement by TSL.

FIGURE 1: Some Free Android *Bluetooth*® Terminal Applications (top row)

PAIRING THE 1128 UHF READER

To use the 1128 Reader with an Android device over *Bluetooth*® requires the two devices to be paired. Device pairing can be established using the Settings Application as follows:

1. Ensure that the 1128 Reader is powered on and that the Blue LED is flashing
2. Go to the Settings App and select the *Bluetooth*® settings panel
3. Locate the 1128 Reader in the 'DEVICES AVAILABLE' list and tap the row to pair the device (see Figure 2)
   a. If the device does not appear in the list pull the trigger to ensure the 1128 is still awake and tap the 'Search for Devices' button
4. Once the device has been successfully paired it will appear in the 'PAIRED DEVICES' section

Note: Pairing can sometimes also be available directly from within an App

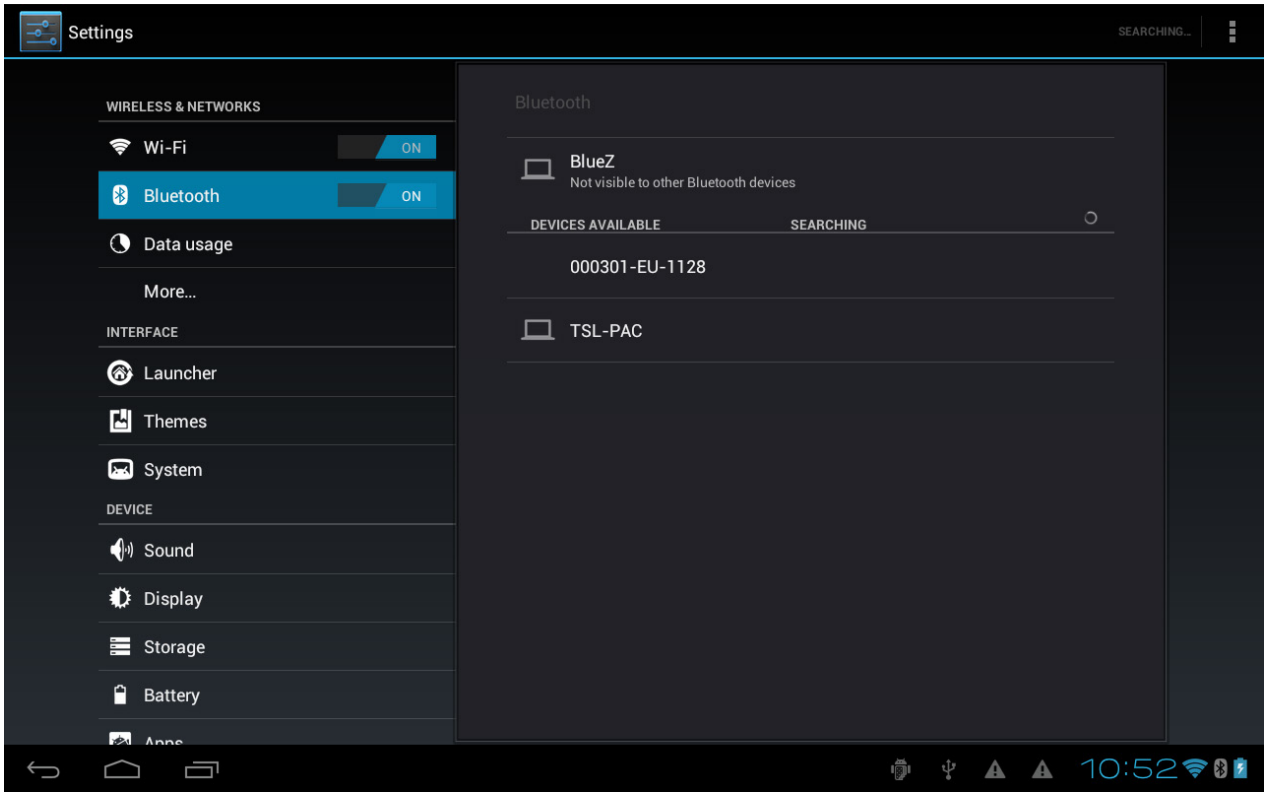

FIGURE 2: Android (4.0) *Bluetooth*® Settings

BLUETOOTH® TERMINAL APPS

Once the 1128 Reader has been paired with the Android device, it can be controlled using any *Bluetooth*® terminal App that supports Serial Port Profile (SPP) communication and that can make non-secure connections. There are many suitable terminal Apps in the Google Play Store, details below illustrate the connection procedure for the S2 App:

1. Ensure the 1128 Reader is on and the Blue LED is flashing
2. Launch the App
3. Tap the CONNECT A DEVICE button
4. In the dialog box that appears, ensure that 'Use secure connect' is not checked (See Figure 3)
5. Choose the 1128 Reader from the list of paired devices
6. The App will now connect to the reader and be ready to issue commands and receive responses

FIGURE 3: Ensure 'Use secure connect' is not checked

CONTROLLING THE 1128 USING TSL ASCII 2.0 COMMANDS

With the 1128 Reader connected to the Terminal App it is a simple matter to issue commands and see the reader's responses. All TSL ASCII commands must start with the period character '.' (0x2E) and be terminated with a line termination character that can be either CR or LF or both. In the examples that follow all commands will be issued as complete lines with terminator. It is also possible to send commands a character at a time but be aware that once the '.' Has been sent the remainder of the command should be sent within 30 seconds otherwise the reader will generate an error and abort the (incomplete) command.

All responses from the reader are in the format of single line fields terminated by the CR/LF pair. A field always begins with a two character (upper-case) header followed by a colon ':'. The remainder of the field is the value. The first response field to a command is the CS: field with sent command line as its value. All command responses end with either the OK: response if successfully completed or the ER:nnn response in the case of an error (where nnn is the error number).

In the examples that follow commands sent to and received from the reader will be shown using the Courier New font like this:

```
MF: TSL UK Ltd.
```

Line terminators will be omitted for clarity.

The following sections are presented in a tutorial style with additional concepts introduced as needed. So to begin with let's find out more about the currently connected reader…

INTERROGATING THE READER FOR ITS CURRENT STATE

There are several commands that can be used to determine the current state of the reader.

BATTERY LEVEL

The current state of the reader's battery can be obtained using the .bl command. It is a simple command that takes no parameters:

Command:

```
.bl
```

Response:

```
CS: .bl
BP: 28%
CH: Charging
OK:
```

The above response shows that the reader's battery currently has 28% of full power and is being charged.

VERSION INFORMATION

The `.vr` command is used to obtain the version information for the reader:

Command:

```
.vr
```

Response:

```
CS: .vr
MF: TSL UK Ltd.
US: 1128-EU-000301
PV: 2.0.0
UF: 3.1.0
UB: 1.4.0
RS: 1116-ET-006504
RF: 2.6.0
RB: 1.2.0
AS: 1128-S1-EU-000301
OK:
```

This will appear on S2 BT Term as shown in Figure 4.

Full descriptions of the response fields can be found in the *TSL ASCII Protocol 2.0* reference document but it is worth noting here that the serial number returned by the US: field is in a different format than is used in the *Bluetooth*® Friendly Name seen when pairing and connecting the device.

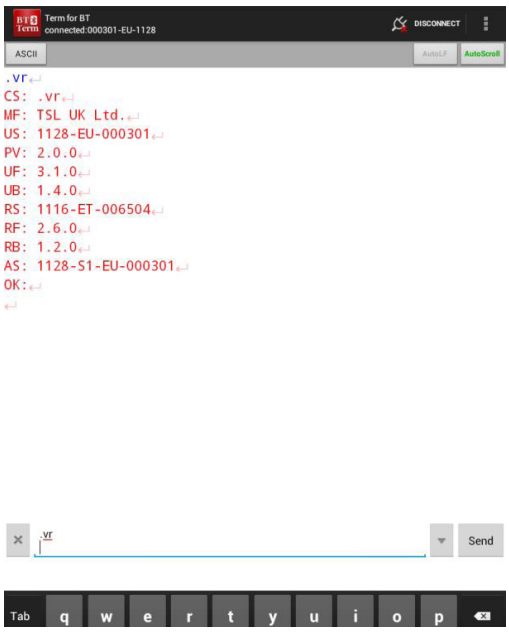

FIGURE 4: Version Information Command

COMMAND PARAMETERS

Many of the TSL ASCII commands require further information to be effective and this is supplied in the form of command parameters. All command parameters begin with the minus sign '-' (0x2D) and are followed by the parameter identifier and any required values. Parameters can be optional as illustrated by the date command below.

DATE AND TIME – PARAMETERISED COMMANDS

For readers such as the 1128, that contain a real-time clock, the .da and .tm command can be used to both read the current clock value and to set it to a new value. To read the current date the .da command is issued without parameters:

Command:

```
.da
```

Response:

```
CS: .da
DA: 2013-05-19
OK:
```

To set the date of the reader's clock the .da command is used with the –s parameter. The parameter value is in the format yymmdd so -s130619 represents June 19th 2013.

Command:

```
.da -s130619
```

Response:

```
CS: .da -s130619
DA: 2013-06-19
OK:
```

The .tm command uses the same pattern with –s used to set the value e.g.

Command:

```
.tm -s125030
```

Response:

```
CS: .tm -s125030
TM: 12:50:30
OK:
```

Now we know a little about the state of our reader and can set its clock to the correct time let's use it for its primary purpose – reading UHF RFID Transponders.

PERFORMING AN INVENTORY OF UHF RFID TRANSPONDERS (TAGS)

The Inventory command has many parameters that can be used to adjust the type of inventory performed by the reader and the amount of information returned for each tag. The default settings for the command perform a session 1 inventory using a dynamic Q with the antenna power set to 29 dBm (maximum). To ensure that the Inventory command is using its default parameters we will reset the commands parameters.

STORED PARAMETERS, RESETTING AND THE NO ACTION OPTION

The Inventory command (`.iv`) is one of many commands that store parameters for future use. When the simple `.iv` command is issued with no parameters it uses the stored configuration to execute the command.

When the state of the reader is unknown we can use the–x parameter reset option to reset all of the commands parameters before executing the requested command. So to perform an Inventory with the default parameters regardless of the current state of the reader we can send the following command:

Command:

```
.iv -x
```

Response:

```
CS: .iv -x
EP: 00000000000000000002033
EP: 0000000000000000000209C
EP: 11112222333344445556666
EP: 000000000000000000020B4
EP: 00000000000000000002034
OK:
```

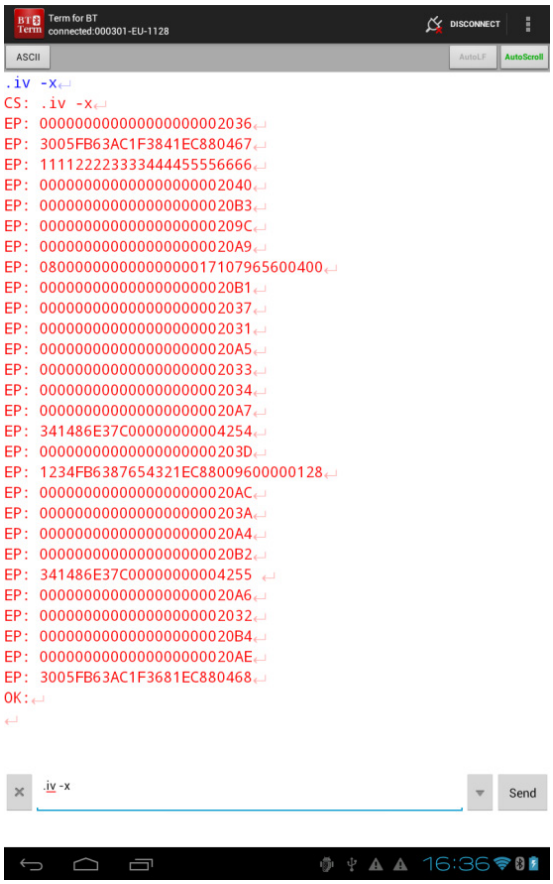

FIGURE 5: Default Inventory Command and Response

It is often useful to configure the type of Inventory to be performed without actually executing it and to do this the `-n` parameter is used. When the `-n` option is specified the command will set any parameters supplied but there will be no action executed. So, to reset the inventory to the default state without actually performing an inventory we can do this:

Command:

```
.iv -x -n
```

Response:

```
CS: .iv -x -n
OK
```

Now let us look at some other parameters for the Inventory command.

CONTROLLING THE TAG INFORMATION RETURNED FROM AN INVENTORY

The `.iv` Inventory command by default will return only the EPC of any tags currently in range of the reader. To make all inventories return the other components of the transponders EPC memory bank we can issue the following command:

Command:

```
.iv -n -e on -c on
```

Response:

```
CS: .iv -n -e on -c on
OK:
```

This command has set the inventory configuration to return the PC word `(-e on)` and the EPC checksum `(-c on)`. So if we now issue a plain .iv command we get the following response:

Command:

```
.iv
```

Response:

```
CS: .iv
EP: 000000000000000000002033
CR: 0D7B
PC: 3000
EP: 00000000000000000000209C
CR: 497E
PC: 3000
EP: 111122223333444455556666
CR: 1835
PC: 3000
OK:
```

Note: The plain `.iv` Inventory command is also the default action assigned to the 1128 trigger single press action so pulling the trigger will produce the same response as above.

CHANGING THE TYPE OF INVENTORY

The `.iv` Inventory command by default uses the session 1 flags but this can easily be changed as follows to perform an inventory using session 2:

Command:

```
.iv -x -qs s2
```

Response:

```
CS: .iv -x -qs s2
EP: 341486E37C00000000004254
EP: 341486E37C00000000004255
OK:
```

Notice that this example used the `-x` option to return all other configuration parameters to their defaults.

The following example shows the use of the `-qt` parameter to first inventory all tags that currently have session 2 flags in state A and then to repeat the inventory to confirm that the tags have now switched to state B for session 2. (Note the second command needs to be performed before the tags revert to the A state)

Command:

```
.iv -x -qs s2 -qt a
```

Response:

```
CS: .iv -x -qs s2 -qt a
EP: 00000000000000000002033
EP: 0000000000000000000209C
EP: 00000000000000000002040
EP: 341486E37C00000000004255
EP: 3005FB63AC1F3841EC880467
EP: 111122223333444455556666
EP: 3005FB63AC1F3681EC880468
EP: 341486E37C00000000004254
EP: 00000000000000000002034
OK:
```

Command:

```
.iv -x -qs s2 -qt b
```

Response:

```
CS: .iv -x -qs s2 -qt b
EP: 00000000000000000002033
EP: 341486E37C00000000004255
EP: 00000000000000000002034
EP: 111122223333444455556666
EP: 0000000000000000000209C
EP: 3005FB63AC1F3681EC880468
EP: 3005FB63AC1F3841EC880467
EP: 00000000000000000002040
EP: 341486E37C00000000004254
OK:
```

After performing inventories with various settings it may be useful to know the complete current configuration of the command. The next section shows how this can be achieved.

FINDING THE CURRENT COMMAND CONFIGURATION

The `.iv` Inventory command supports the –p parameter. This parameter can be used with many other commands too and its role is to list all the parameters that a command supports and the current setting for each.
The parameter values are returned after any other parameters have been set and any action executed. So, for example, to obtain the full list of parameters for the default Inventory command execute the following command:

Command:

```
.iv –x –n –p
```

Response:

```
CS: .iv –x –n –p
PR: –al on –c off –dt off –e off –io on –ix off –n –o 29 –p –qa dyn –ql
all –qs s1 –qt a –qv 6 –r off –sa 0 –sb epc –sd –sl 00 –so 0000 –st s1 –x
OK:
```

The TSL ASCII Protocol 2.0 reference guide gives a full explanation of each of these parameters but you will recognise parameters such as `–e` or `–c` from the examples above.

This section has demonstrated just a few of the options available with the inventory command, additional details are also available in the TSL ASCII Protocol 2.0 reference guide.

The other primary source of data from the reader comes from the Barcode scanner (Imager Antenna required).

SCANNING BARCODES

For readers equipped with imaging antennas, the .bc command can be used to read barcodes in all the common formats. This section will use the 1-D and 2-D barcodes shown below (Figure 6). The encoded content of the barcodes is the text written below them.

The imaging engine can be commanded to scan for barcodes for up to 9 seconds. This is how to do it:

Command:

```
.bc -t9
```

Response:

```
CS: .bc -t9
BC: Technology Solutions (UK) Ltd.
OK:
```

1-D Barcode

Data Matrix

FIGURE 6: Sample Barcodes

The responses can be time-stamped with the reader's real-time clock using this command:

Command:

```
.bc -dt on -t9
```

Response:

```
CS: .bc -dt on -t9
DT: 2013-06-19T16:18:10
BC:12345678
OK:
```

Note: The .bc Barcode command is also the default action assigned to the 1128 trigger double press action.

SUMMARY

This document outlined how to connect to an 1128 reader using an Android device and the S2 *Bluetooth*® Terminal. A small sample of the TSL ASCII command protocol was presented illustrating: querying the state of the reader, performing inventories and also the scanning of barcodes.

Having completed this introduction, we recommend that you use the TSL ASCII Protocol 2.0 reference guide to explore the capabilities of the 1128 further.

APPENDIX: CONNECTING TO OTHER *BLUETOOTH*® TERMINAL APPS

For illustration, instructions for the connection procedure of two other Apps are listed below. These Apps are also available from the Play Store.

Bluetooth® Terminal

https://play.google.com/store/apps/details?id=Qwerty.BluetoothTerminal

Bluetooth® SPP Pro

https://play.google.com/store/apps/details?id=mobi.dzs.android.BLE_SPP_PRO

1. *Bluetooth*® Terminal

a. Ensure the 1128 Reader is on and the Blue LED is flashing

b. Launch the App

c. Tap on the Menu (Three vertical dots) button

d. Tap on Connect a device – insecure

e. Choose the 1128 Reader from the list of paired devices

- The 'Scan for devices' button can be used to find an 1128 Reader that has not already been paired.

f. The App will now connect to the reader and is ready to issue commands

2. *Bluetooth*® SPP Pro

a. Ensure the 1128 Reader is on and the Blue LED is flashing

b. When the App launches it scans for devices

- i. If the desired reader is not shown use the SCAN button to repeat the scan

c. Choose the 1128 Reader from the list of paired devices. The screen changes to show the device details and a 'Connect' button.

d. Tap the Connect button

e. From the 'Select Communication mode' options that appear, tap the 'CMD line mode'

f. Use the Menu button to ensure that the 'end flag' is set to either "Char('\r\n')" or "Char('\n')"

g. The App is now connected to the reader and is ready to issue commands

ABOUT TSL

ABOUT

TSL designs and manufactures both standard and custom embedded, snap on and standalone peripherals for handheld computer terminals. Embedded technologies include:

- RFID - Low Frequency, High Frequency & UHF
- *Bluetooth*® wireless technology
- Contact Smartcard
- Fingerprint Biometrics
- 1D and 2D Barcode Scanning
- Magnetic Card Readers
- OCR-B and ePassport

Utilizing class leading Industrial design, TSL develops products from concept through to high volume manufacture for Blue Chip companies around the world. Using the above technologies TSL develops innovative products in a timely and cost effective manner for a broad range of handheld devices.

CONTACT

Address:	Technology Solutions (UK) Limited, Suite C, Loughborough Technology Centre, Epinal Way, Loughborough, Leicestershire, LE11 3GE. United Kingdom.
Telephone:	+44 (0)1509 238248
Fax:	+44 (0)1509 220020
Email:	enquiries@tsl.uk.com
Website:	www.tsl.uk.com

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