Cable Application Note

Revision History

Revision	Release Date	Description of Change
Rev 1.0	2011/10/17	New Release

Content Summary

1 Introduction

The documentation describes the functionalities and features of SLAVE and MASTER on RF Virtual Cable Applications. The SLAVE and MASTER devices are the low power RF modules working at sub-1G Hz ISM band and can be used on many applications. On RF Virtual Cable applications, SLAVE or MASTER devices can establish a RF channel with each others. Data can be received from UART interface of SLAVE or MASTER devices and be transmitted through established RF channel. With RF Virtual Cable applications, traditional wired RS232 or RS485 data transmit can be replaced by the virtual cable of the wireless RF channel.

2 The Virtual Cable of the RF channel

Before data are transmitted, the virtual cable of the RF channel must be established. One SLAVE or MASTER device with RF virtual cable application can establish maximum 8 RF Channels with other SLAVE or MASTER devices. After the virtual cables of the RF channel are established, data transmit can be made through all available virtual cables at the same time. The detail to establish the virtual cable of the RF channel and control the data transmit will be provided on this section.

2.1 Basic Configuration

The first thing to establish the virtual cables of the RF channel is to set up RF parameters. RF channel need to be set at the same channel number and RF power can extend the distance of the devices.

2.2 Data and Command Mode

Data and Command can be input from UART interface. To separate them, Data and Command Mode are provided. On Data Mode, "+++" command can switch to Command Mode. On Command Mode, "MODE" command can switch to Data Mode. The default mode of the SLAVE or MASTER devices on RF virtual cable application is Data Mode. To configure the devices, Command Mode needs to be switched at the beginning.

2.3 Link Token and Peer Token

On SLAVE or MASTER devices, Link Token is the address of the device. The Link Token of each device must be unique. The communication between devices is based on the Link Token to identify the source and destination device. The Peer Token is the address of the communicated devices. When Peer Token is configured, the virtual cable of the RF channel will be established. The data can be received and transmitted between devices. 8 Peer Token can be set on SLAVE or MASTER devices. Let's take an example to show how to configure the Peer Token and how it works.
SLAVE or MASTER devices can be configured by CLI commands through UART interface. You can use "RF" command to read current configuration on Flash memory. Take a look the following diagrams to show the three devices, A, B and C.

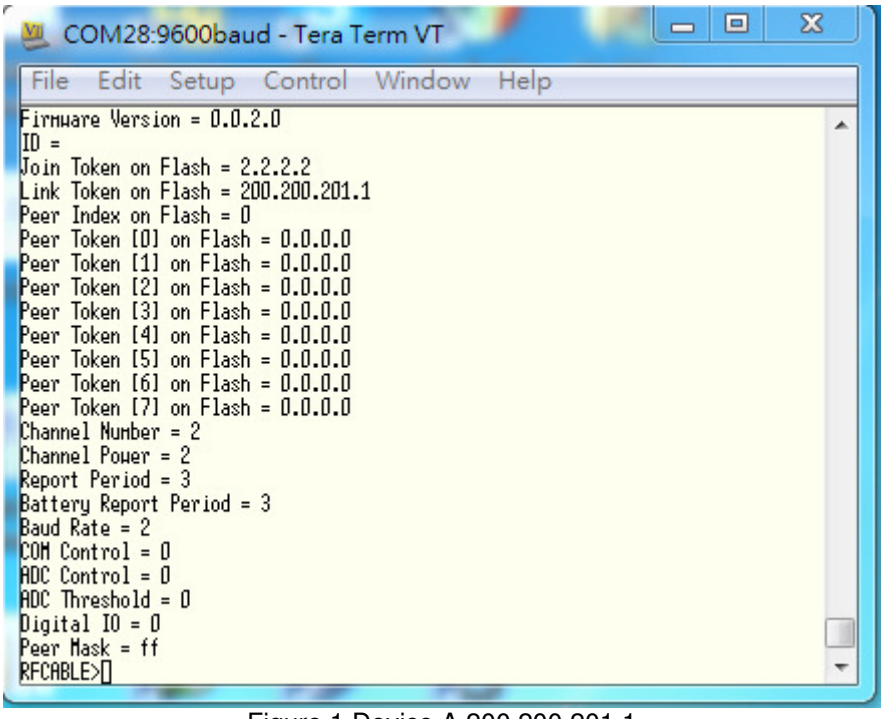


Figure 1 Device A 200.200.201.1

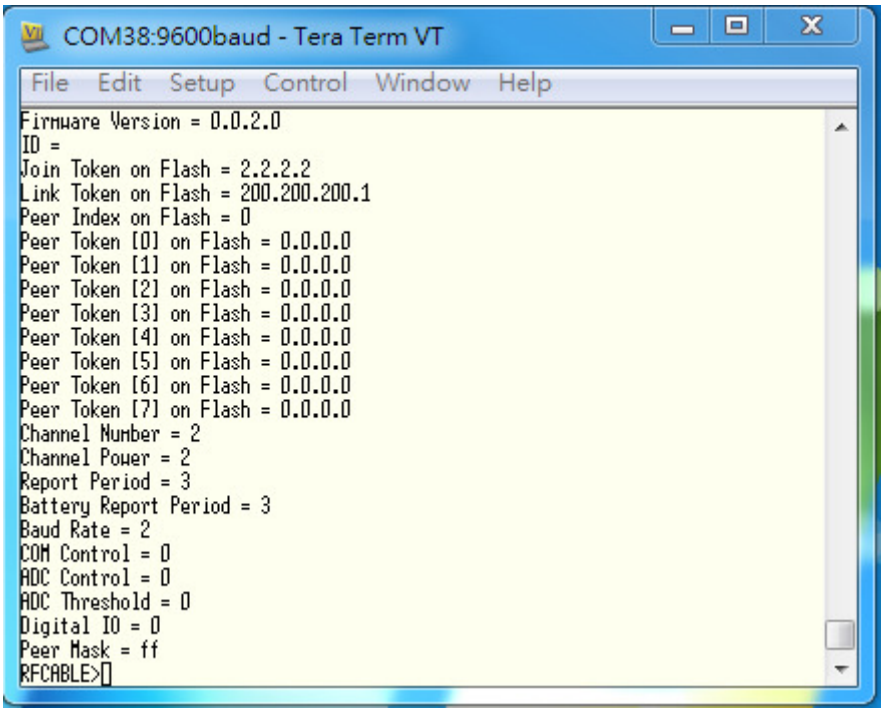


Figure 2 Device B 200.200.200.1

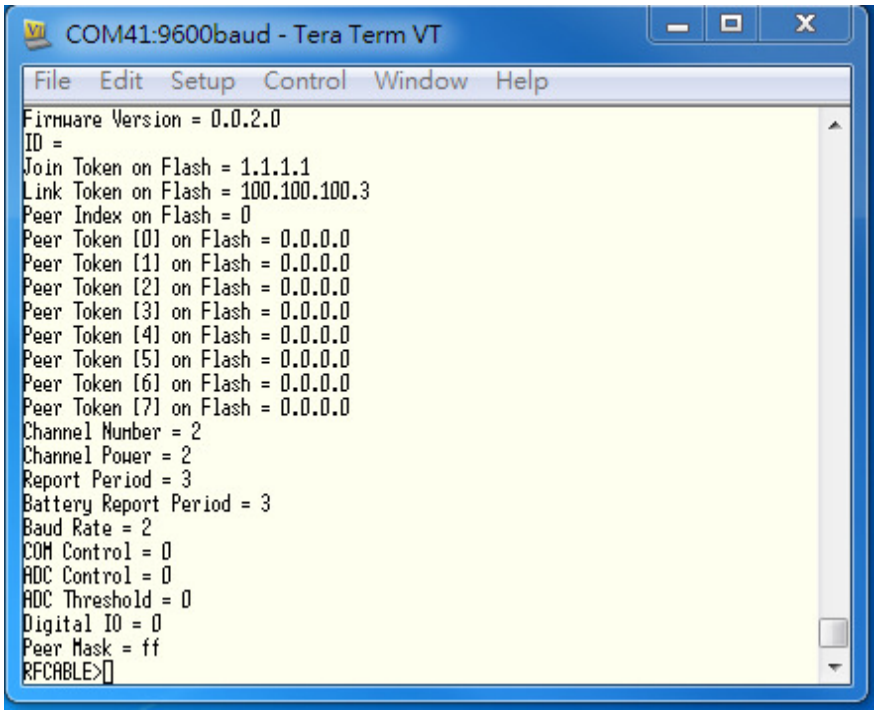


Figure 3 Device C 100.100.100.3

Link Token has been configured on default. 8 Peer Tokens can be set on each device. “PT” command is provided on each device. Let us set the peer token with each others. The results go follows:

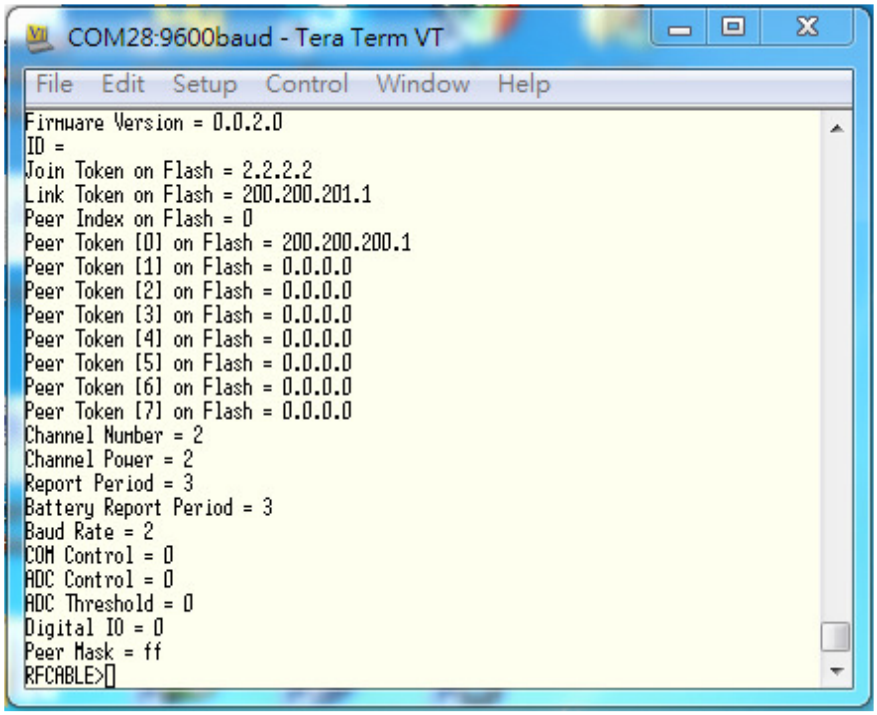


Figure 4 Device A Peer Token

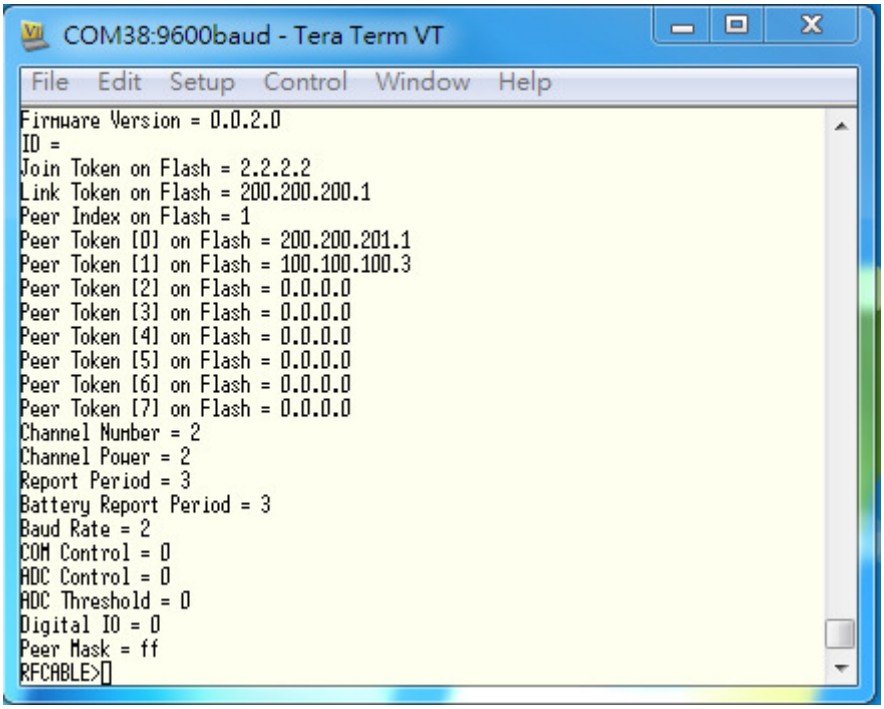


Figure 5 Device B Peer Token

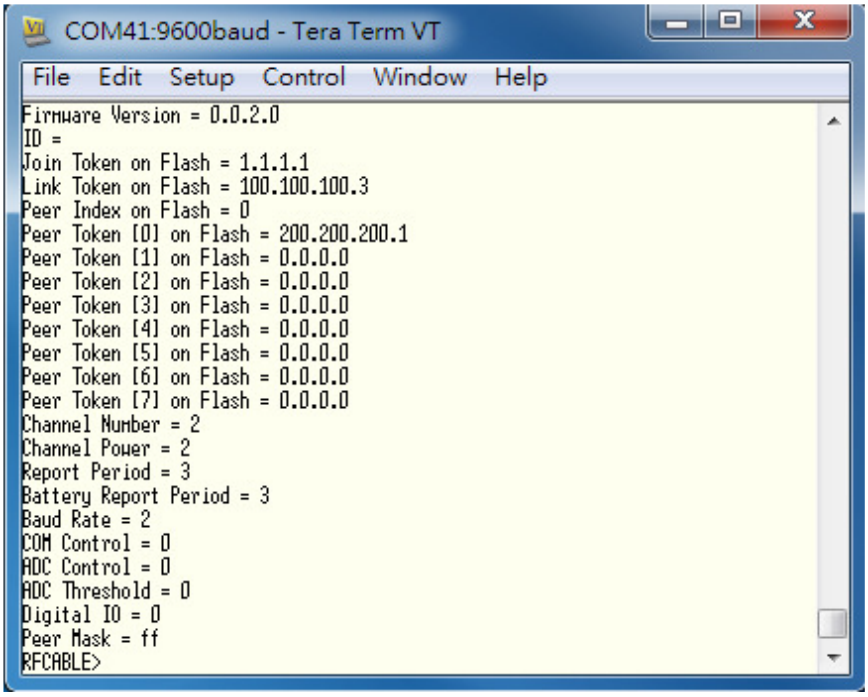


Figure 6 Device C Peer Token

On Device A, the Link Token of the Device B is set to Peer Token[0]. On Device B, the Link Token of the Device A and C are set to Peer Token[0] and Peer Token[1]. the Link Token of the Device B is set to Peer Token[0]. After Peer Tokens are configured properly, the virtual cable of the RF channel will be established.

2.4 Data MODE

After the virtual cable of the RF channels are established, data transmit can be made. The data can be input from UART interface. To switch the command mode to data mode, “MODE” command can be used. Take a look the following diagrams to show the three devices, A, B and C on data mode.

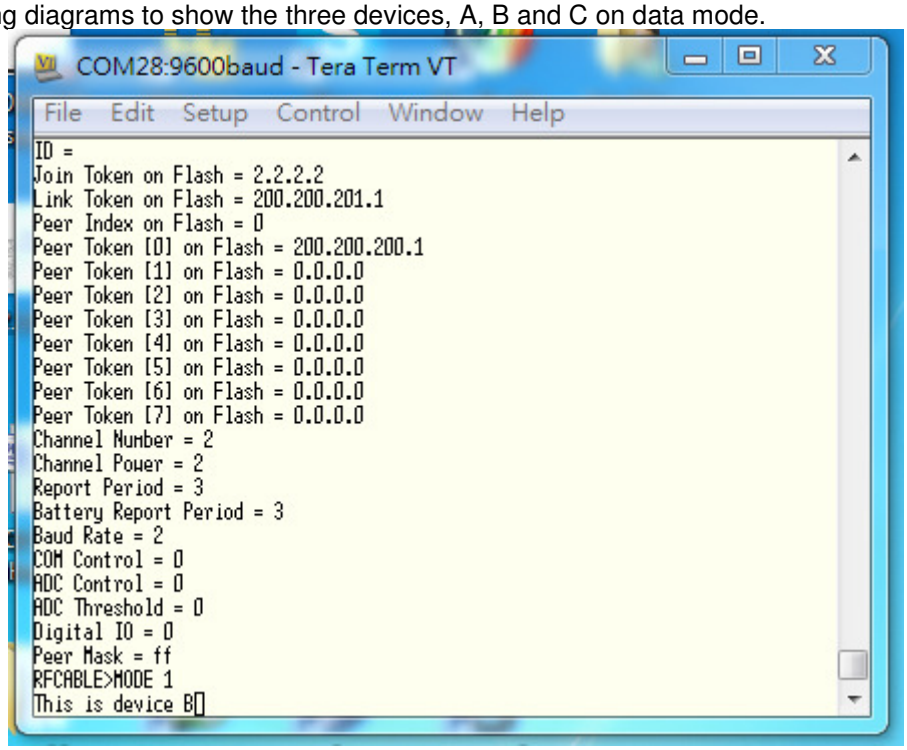


Figure 7 Device A data receive and transmit

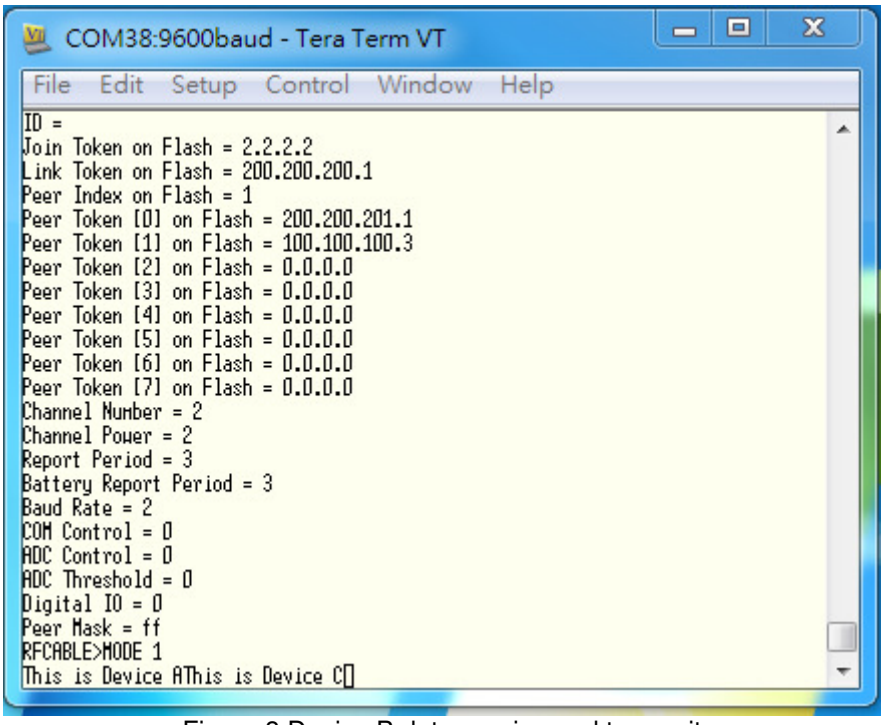


Figure 8 Device B data receive and transmit

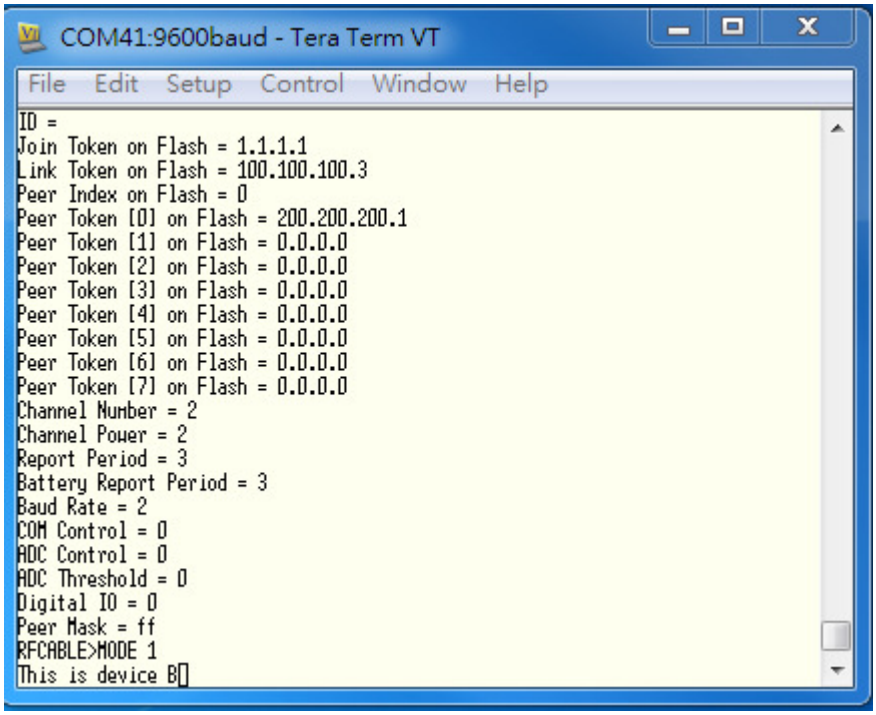


Figure 9 Device C data receive and transmit

After change to data mode, the data from UART interface will be transmitted to the peer devices through the virtual cable of the RF channel. The data from the device B are transmitted to Device A and C at the same time and the data from the device A and C are transmitted to B only. “+++” command can be used to switch data mode to command mode again.

2.5 Peer Mask

Peer Mask can be used to control the data transmit. Each bit of Peer Mask is represented to the each Peer Token. Bit One of the Peer Mask is used to control the Peer Token[0], Bit Two of the Peer Mask is used to control the Peer Token[1] and so on. If the Bit of Peer Mask is zero, the data transmit will be ignored.
Please refer to the Appendix on Chapter 4, page 10.

3 Commands

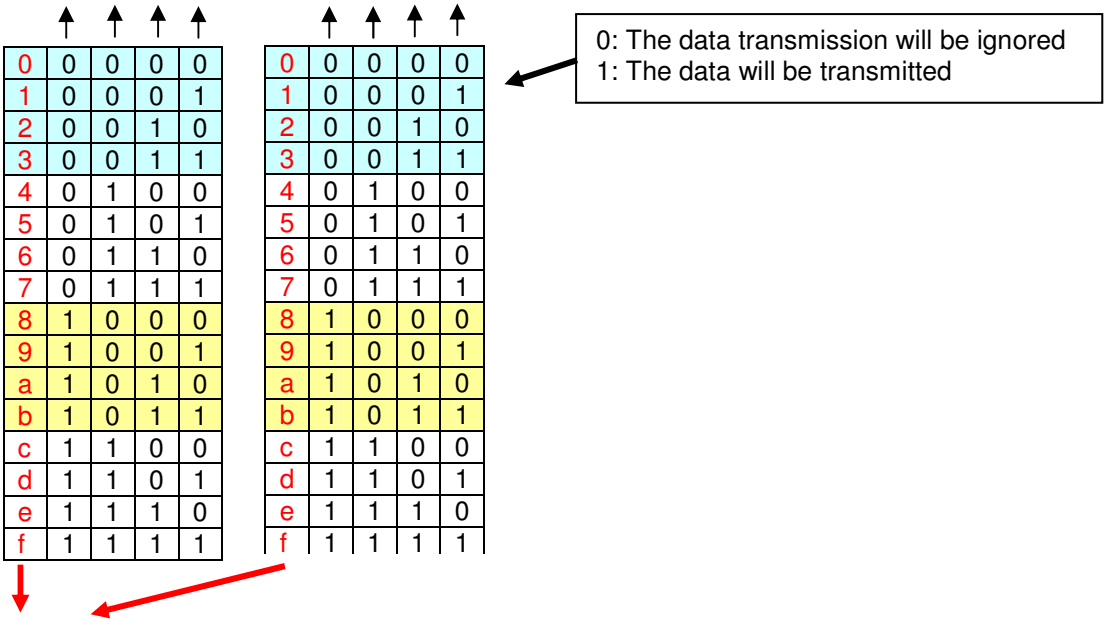
All available commands on Slave and Master device are on the Table.

Command	Description	Options	Default Value
LT	Set Link Token by IP address format	0.0.0.0 ~ 255.255.255.255	0x01020304
PT	Set Peer Token by IP address format with Peer Index	Peer Index: 0-7 Peer Token: 0.0.0.0 ~ 255.255.255.255	0 0.0.0.0
RF	Read configuration data from flash memory.		
WF	Write configuration data to flash memory.		
CN	Configure channel number.	1: 922 2: 924 3: 926 4: 928	2:924
CP	Configure channel power.	1: -10 2: 0 3: 10	2:0
COMBR	Configure Baud Rate of COM port.	1: 4800 2: 9600 3: 19200 4: 38400 5: 57600 6: 115200 7: 230400	2:9600
COMCL	Configure control of COM port.	Bit 7 Parity enable 0: Parity disabled 1: Parity enabled Bit 6 Parity select 0: Odd parity 1: Even parity Bit 4 Character length 0: 8-bit data 1: 7-bit data Bit 3 Stop bit select 0 One stop bit 1 Two stop bits	0 Parity disabled Odd parity 8-bit data One stop bit
SHOW	Display all configuration setting.		
RB	Reboot the device.		
EX	Save configuration and Reboot		
MODE	Switch Data and Command Mode	0: Command Mode 1: Data Mode	1
PM	Peer Mask	Refer to the page 10	ff
AS	Address (Refer to the page 11)	0: The IP address of remote device will not appear 1: The IP address of remote device will appear	0

Table 1: Commands on SLAVE or MASTER devices of RF virtual cable application

4 Appendix

4.1 Peer Token No.: [0] [1] [2] [3] [4] [5] [6] [7]



	[0]	[1]	[2]	[3]
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
a	1	0	1	0
b	1	0	1	1
c	1	1	0	0
d	1	1	0	1
e	1	1	1	0
f	1	1	1	1

	[4]	[5]	[6]	[7]
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
a	1	0	1	0
b	1	0	1	1
c	1	1	0	0
d	1	1	0	1
e	1	1	1	0
f	1	1	1	1

Peer Mask: ☐ ☐

Example:
Link Token on Flash = 0.0.0.1

Peer Token [0] on Flash = 0.0.0.2
Peer Token [1] on Flash = 0.0.0.3
Peer Token [2] on Flash = 0.0.0.4
Peer Token [3] on Flash = 0.0.0.5
Peer Token [4] on Flash = 0.0.0.6
Peer Token [5] on Flash = 0.0.0.7
Peer Token [6] on Flash = 0.0.0.8
Peer Token [7] on Flash = 0.0.0.9

Command “PM ac” means:

	[0]	[1]	[2]	[3]		[4]	[5]	[6]	[7]
a	1	0	1	0	c	1	1	0	0

The local adapter which IP is 0.0.0.1 will transmit the data to peer token [0], [2], [4], [5] and will not transmit to the else.

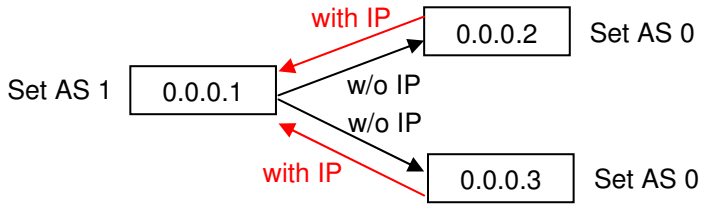
Every adapter can be configured the “PM” command for data transmission. The default value is “ff” which means the adapter can transmit to all other adapters paired by “PT” command.

4.1 Command AS: Turn on or off of the IP address comes from remote device
Command "AS 1" is to append remote device information to RS232 msg.

Example 1:
If we received a message from 100.100.100.1
Original message is: ABCD
now is: (byte0 Number)100 (byte1 Number)100 (byte2 Number)100 (byte3 Number)1 (byte4)A (byte5)B (byte6)C (byte7)D
The first 4 bytes are used to store the peer address of remote device.

Command "AS 0" is not to append remote device information to RS232 message.
By default the address information is not appended to RS232 message.

Example 2: For one to multi-points transmission applications.



Remark: The character '+' will not be transmitted to remote device.