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APN Content Level: BASIC INTERMEDIATE ADVANCED Confidentiality: Public Private

Software Compatibility*	Firmware:	R65	Open AT® SW Suite	1.0	IP Connectivity:	N/A	Compiler Used:	N/A	Reference Hardware	No
									Reference Software	Yes

* refer to software compatibility matrix section for more detail

Wireless CPU Compatibility	Plug & Play:	M1306B	<input checked="" type="checkbox"/>	M2106B	<input checked="" type="checkbox"/>									
	Quik (CDMA):	Q2438F		Q2438R		CM52								
	Quik (GSM):		Q2400A	<input checked="" type="checkbox"/>	Q2406A	<input checked="" type="checkbox"/>	Q2406B	<input checked="" type="checkbox"/>	Q2426B	<input checked="" type="checkbox"/>	Q2501B	<input checked="" type="checkbox"/>		
			GR64		GS64		Q2686H	<input checked="" type="checkbox"/>	Q2687H	<input checked="" type="checkbox"/>				
			Q24 Classic	<input checked="" type="checkbox"/>	Q24 Plus	<input checked="" type="checkbox"/>	Q24 Extended	<input checked="" type="checkbox"/>	Q24 Auto	<input checked="" type="checkbox"/>				
Wireless Microprocessor		WMP100	<input checked="" type="checkbox"/>	WMP150	<input checked="" type="checkbox"/>									

1 Introduction

Fax is the term for the electronic transmission of printed documents over a phone line.

There are basically two classes of Fax.

Class 1:

This includes Class 1 and Class1.0. Class 1 is a standard defined by EIA/TIA-578 (1990). Its implementation is fairly standard across manufacturers. Common Class 1 commands are "AT+FTH=3", "AT+FRM=146" and AT+FTS=7. Class 1.0 is a standard defined by ITU-T.31. This standard is almost identical to its predecessor, EIA/TIA-578 with the addition of a few advanced commands and, in its Amendment 1, defines a slightly different communication method to be used with V.34-Fax (SuperG3).

Class 2:

This includes Class 2, Class2.0 and Class 2.1. Class 2 is a standard defined by the unfinished 1990 draft of what shall later become EIA/TIA-592. Common Class 2 commands are "AT+FDR" (receive data), "AT+FDCC=?" (Describe DCE capabilities), and "AT+FDIS=?" (Describe DCE settings). Some manufacturers, most notably Rockwell, have derived a standard on this draft of the Class 2 standard years before it was published. Because this standard has significantly changed between 1990 and 1993 and there were so many Class 2 modems in use that supported the 1990 draft, a distinction has been made between Class 2 drafts. Class 2.0 is a standard defined by EIA/TIA-592 (1993). Common commands are "AT+FDR" (receive data), "AT+FCC=?" (Describe DCE capabilities), and "AT+FIS=?" (Describe DCE settings). Class 2.1 is a standard defined by ITU-T.32. It is an extension to Class 2.0. In addition to the features supported in Class 2.0, a Class 2.1 modem may support "extended" resolutions beyond normal and fine, and it may also support V.34-Fax.

2 Implementation in Wavecom Modems

The communication of Data from the Wavecom modules is done through the DATA layer. Wavecom modems support both classes of Fax. They are implemented as a library in the DATA layer. The Fax library manages all Fax related operations for the module.

The Data Layer calls Fax APIs for all Fax related operations. This includes the following:

Fax AT commands

The ATI layer sends all Fax related AT command messages to the data layer. The Data layer calls the fax library function to handle the message. Fax related AT commands for different Fax classes are explained in section 3.

Fax session management

This includes management of call setup, release, disconnection, handover etc.

Fax parameter configurations

Parameters and other configurations are saved in EEPROM and RAM. The Fax library manages the same for its internal variables. The FAX library takes care of the data security. For this reason the transmission of fax data must be in non-transparent mode.

3 Send/Receive Fax Using AT Commands

The Wavecom module supports various AT commands for Fax-related operations. This section describes the AT commands to be used to set options and send/receive Fax.

3.1 Initial Settings

The settings configuration on the transmitter side and receiver side are explained below:

Setting on transmitter side
AT+CBST=6,0,0 OK
AT+FCLASS=1 // 2 should be used for Class 2 OK
AT+FCR=0 OK
AT+IPR=0 OK

Settings on receiver side
AT+CBST=6,0,0 OK
AT+FCLASS=1 // 2 should be used for Class 2 OK
AT+FCR=1 OK
AT+IPR=0 OK

3.2 Send Fax

The sequence of commands to be used for sending a Fax is shown in the table below. Prior to issuing these commands, the sender side must be configured with the settings detailed in the previous section.

Send a Fax Class 2
AT+FCLASS=2 // Select fax class 2

```

OK

AT+FLID= Local Fax
OK

ATD0601234567 // Call establishment
+FCON // Connection OK
[+FCSI: RemoteFax ]
+FDIS:0,3,0,2,0,0,0,0
OK

AT+FDT // Beginning of data transfer
+FDCS:0,3,0,2,0,0,0,0
CONNECT
<0x11h> // Send carrier
// First page data terminated by
<0x10h><0x03h>
OK
Page transmitted

AT+FET=0 // Send another page
+FPTS:1 // First page acquitted
OK
AT+FDT
CONNECT
<0x11h> // Send carrier
// Second page data terminated by
<0x10h><0x03h>
OK
Page transmitted

AT+FET=2 // No more page
+FPTS:1 // First page acknowledged
+FHNG:0 // Normal end of connection
OK
    
```

3.3 Receive Fax

The sequence of commands to be used to receive a Fax is shown in the table below. Prior to receiving responses, the receiver side must be configured with the settings mentioned in the previous section.

Receive a fax class 2	
AT+FCR=1	
OK	
AT+FLID= LocalFax	
OK	
RING	// Incoming call
ATA	// Answer
+FCON	// Connection OK
[+FTSI: RemoteFax]	
+FDCS:0,3,0,2,0,0,0,0	
OK	
AT+FDR	
+FCFR	
+FDCS:0,3,0,2,0,0,0,0	
CONNECT	
<0x12h>	// Receive page carrier
	// First page data terminated by
<0x10h><0x03h>	
+FPTS:1	// First page acknowledged
+FET:0	// To receive another page
OK	
AT+FDR	

```

CONNECT
<0x12h> // Receive page carrier
// Second page data terminated by
<0x10h><0x03h>
+FPTS:1 // Second page acknowledged
+FET:2 // No more page to receive
OK

AT+FDR
+FHNG:0 // Normal end of connection
OK
    
```

4 Send/Receive Fax using Open AT®

Open AT® does not provide direct APIs to send/receive Fax. However, the same can be achieved by using AT commands provided by Wavocom to send and receive Fax. This section explains how an Open AT® application must be implemented to be able to send/receive Fax.

4.1 Open AT® Features to Be Used

There are three main features in Open AT® that must be used in order to implement Fax. They are described below:

1) AT Command APIs

This feature is used to issue Fax related AT commands to the module. The configuration and AT commands set up mentioned in the previous section must be issued using the *AT command APIs*. The responses for these AT commands can be managed within the response handlers.

2) Flow Control Manager APIs

This feature is used to send and receive all Fax data sent to and from the GSM network. Hence, the user must subscribe to the GSM Flow feature. After the successful configuration and setup of the module to send and receive Fax, data can be sent and received using the *Flow Control APIs*.

3) Call APIs

This feature is used to answer the Fax call on the receiver side. The user must subscribe to the Call feature. This feature allows the user to answer an incoming Fax call.

4.2 Initial Settings

The necessary settings on transmitter receiver sides, detailed in section 3.1 must be configured using the AT command APIs. The API to be used is `adl_atCmdCreate ()`. The user must make sure that all the settings are entered correctly by managing the responses in the response handler.

4.3 Send a Fax

This section details the Open AT® APIs that must be used to send a Fax.

1. Set all the configurations required for the Fax transmitter as explained in the previous section, using AT Command APIs.
2. Set the following parameters using the AT command API `adl_atCmdCreate ()`. Make sure that all the commands are executed successfully by handling the responses in the respective response handlers.

```
AT+FCLASS=2 // Select fax class 2
OK
```

```
AT+FLID= Local Fax
OK
```

```
ATD0601234567 // Call establishment
+FCON // Connection OK
```

```
[+FCSI: Remote Fax ]
+FDIS:0,3,0,2,0,0,0,0
OK
```

```
AT+FDT // Beginning of the data transfer
+FDCS:0,3,0,2,0,0,0,0
CONNECT
```

- Before establishing the call, the user must subscribe to the GSM Flow using the Flow Control Manager APIs. Data can be sent to the network using the `adl_fcmSendData ()` API. After getting the "CONNECT" indication, the user can send data to the receiver.
- After the first page has been sent successfully, an OK response is received in the response handler of "AT+FDT" command. After the page is transmitted, the following commands must be sent if another page must be transmitted.

```
AT+FET=0 // Send another page
+FPTS:1 // First page acquitted
OK
AT+FDT
CONNECT
```

- After getting the "CONNECT" indication the user can send data to the receiver. Data can be sent to the network using the `adl_fcmSendData ()` API. So the second page can be sent to the network. An "OK" response is received in the response handler of the "AT+FDT" command, after the second page has been transmitted successfully.
- Issue the following commands using the `adl_atCmdCreate ()` API to end the transmission of the Fax.

```
AT+FET=2 // No more page
+FPTS:1 // First page acknowledged
+FHNG:0 // Normal end of connection
OK
```

- The reception of the "OK" message in the response handler of "AT+FET=2" will confirm that the Fax has been sent successfully.

4.4 Receive a Fax

This section explains the Open AT® APIs and features that must be used to receive a fax.

- Set all the configurations required for the Fax receiver as explained in the previous section, using AT Command APIs.
- Set the following parameters using the AT command API `adl_atCmdCreate()`. Make sure that all the commands are executed successfully by handling the responses in the respective response handlers.

```
AT+FCR=1
OK
```

```
AT+FLID= LocalFax
OK
```

- The user must subscribe to the GSM Flow using the Flow Control Manager APIs before receiving the *RING* indication.
- The Application waits for the *RING* indication. For this, the Open AT® application subscribes for the Call feature and answers the call on receiving the "RING" event in the call handler. Then it issues the following AT commands to set up the Modem in receiver mode.

```
RING // Incoming call
```

```
ATA // Answer
+FCON // Connection OK
[+FTSI: RemoteFax ]
+FDCS:0,3,0,2,0,0,0,0
OK
```

```
AT+FDR
+FCFR
+FDCS:0,3,0,2,0,0,0,0
```

```
CONNECT
```

- After getting the "CONNECT" indication the user will receive Data in the Data Handler of the GSM FCM Flow.
- The user must subscribe for +FPTS and +FET unsolicited responses. This will indicate whether the modem is due to receive more pages. Receiving unsolicited events "+FPTS:1" and "+FET:0" means that module is going to receive another page.
- This page is again received in the GSM Data Handler after issuing the command "AT+FDR" using the `adl_atCmdCreate ()` API.

```
AT+FDR
CONNECT
```

- The second page is again received in the GSM Data Handler. After the unsolicited responses "+FPTS:1" (the second page is acknowledged) and "+FET:2" (no more page to be received) the user must issue the commands "AT+FDR" to end the connection. The unsolicited response "+FHNG:0" will ensure a normal end of connection.

5 Software Compatibility Matrix

List of all current software configurations and compatibility in this application note.

Core	Open AT®	IP	Compatibility
X4x	v2.x	N/A	YES
X5x	v3.x	N/A	YES
6.6x	v4.x	N/A	
R65	v5.00	N/A	YES

6 Support

For direct clients: contact your Wavecom FAE
 For distributor clients: contact your distributor FAE
 For distributors: contact your Wavecom FAE

7 Document History

Level	Date	History	Author
001	21/09/2005	Fax application note	Wavecom Support Consultant
002	07/05/2007	Updation	Wavecom Support Consultant

8 Legal Notice

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