TEXAS INSTRUMENTS

Technical Document

GSM PROTOCOL STACK

GPF

xPANEL – MMI TEST APPLICATION (PC)

USER GUIDE

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0 Document Control

0.1 Change History

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1. Initial version
2. Updated
3. New Document ID introduced

0.2 List of Figures and Tables

0.3 List of References

[ISO 9000:2000]　　　International Organization for Standardization. Quality management systems - Fundamentals and vocabulary. December 2000

[GSM 2.30]　　　ETS 300 511: July 1995 (GSM 02.30 version 4.13.0)
Man-Machine Interface (MMI) of the Mobile Station (MS), ETSI

[PANEL]　　　8415.014.00.105, February 7, 2000, Panel – PC Test Application

[XPAN+]　　　xPanel_plus_design_spec.doc

[XPAN_DD]　　　06-03-36-SLL, xPanel Developer Description (xpan_description.doc)

[MOAN]　　　06-03-53-UDO, MoanBtn – Instant GUI-problem Informer (mbtn_userguide.doc)

[XM]　　　06-03-55-UDO, XM –GUI-frontend for GPF m.bat (xm_userguide.doc)

[PCO2]　　　06-03-35-UDO, PCO2 – Tracing Environment (pco_userguide.doc)

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0.4 Abbreviations

ACI	Application Control Interface (AT Commands)
G23	The Condat implementation of Layers 2 and 3 of the GSM Protocol Stack
G23 Target System	Hardware which executes G23
LCD	Liquid Crystal Display
MM	Mobility Management
MMI	Man Machine Interface
MOC	Mobile Originated Call
MTC	Mobile Terminated Call
PC	Personal Computer
PCO	Point of Control and Observation
PIN	Personal Identification Number
RS232	Serial Communication Standard
Target System	Shortened form of 'G23 Target System'

0.5 Terms

Entity	Program which executes the functions of a layer
Message	A message is a data unit which is transferred between the entities of the same layer (peer-to-peer) of the mobile and infrastructure side. Message is used as a synonym to protocol data unit (PDU). A message may contain several information elements.
Primitive	A primitive is a data unit which is transferred between layers on one component (mobile station or infrastructure). The primitive has an operation code which identifies the primitive and its parameters.
Service Access Point	A Service Access Point is a data interface between two layers on one component (mobile station or infrastructure).

1 Introduction

G23 is a software package implementing Layers 2 and 3 of the ETSI-defined GSM air interface signaling protocol, and as such represents the part of a GSM mobile station's protocol software which is both, platform and manufacturer independent. Therefore, G23 can be viewed as a building block providing standardized functionality through generic interfaces for easy integration.

The G23 suite of products consists of the following items:

- Layers 2 and 3 for speech & short message services,
- Layers 2 and 3 for fax & data services,
- Application Control Interface/AT Command Interface,
- MMI and MMI Framework (MFW) and
- Test and integration support tools.

This userguide is meant to give an introduction of the functionality of xPanel and to explain several important issues in detail. It is based on the assumption that the user is familiar with the basic operation principles of mobile phones. The operation is implemented in accordance with the SMI (Slim Man Machine Interface).

The new eXtended panel has the functionality of the former „Panel" (see [PANEL]) and the „Gameboy" insight. That means in brief it provides a mobile-like keypad and a screen for display response. Furthermore the layout is configurable. Customers themselves should be able to do configuration and creation of new layout files (see 3).

The current xpanel.exe supports serial port communications and simulated communications using shared memory to access a stack.

Unlike the old panel xPanel does not include a PCO for watching traces anymore. To do that you have to use the PCO2 environment (see [PCO2]) together with xPanel.

XPanel does also include moan button support (see [MOAN]), if you got the moanbtn.dll with the package (internal CONDAT workers with ClearCase automatically get it).

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2 Application Manual

2.1 Environment / Installation

To use xPanel some environmental constraints have to be taken into account.

For use under Windows:
At first you'll have to make sure that several DLL-files are available to the system. In the Condat development directory structure you can find them in „<View>/GPF/Bin" and „<View>/GPF/tools/bin":
- Frame-DLLs (frame.dll, tif.dll, misc.dll)
- cms.dll, ipc.dll
- tk84.dll, tcl84.dll

So just make sure „<View>/GPF/Bin" and "<View>/GPF/gnu/bin" are in your PATH-variable. (use e.g. the "initvars.bat" in „<View>/GPF")
From the MS-Explorer you can directly double click on the "<View>/GPF/bin/xpan.bat", which will solve the PATH-problem for you.

Furthermore the Tcl-interpreter expects some files in subdirectories of a lib-folder relative to the start-directory -> "../lib". At Condat all the necessary files can be found in "<View>/GPF/Lib" :
- "tk8.4"-directory
- "tcl8.4"-directory

At least you need to have xpanel.tcl in the same directory as the executable.

For your special needs you may have to change the default ini-file of xPanel
("<view>/GPF/cfg/xpan.ini"). An explanation of the options is given in 2.3.
In "<view>/GPF/cfg" you can find some example ini-s like one for the usage with the TI-Multiplexer ("<view>/GPF/cfg/xpan.ini.ti_mux").

To start meaningful work you additionally need a layout-file –adapted to your needs (see 2.3 and 3.1 for layout usage details). You should use PCO (see [PCO2]) together with xPanel, to watch traces and redirected primitives.

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2.2 Getting started

To start xpanel the first time just start your protocol stack and call "xpanel" (or
click "xpan.bat"). Now you should see the xPanel-window with at least a menu. If
no layout has been loaded, you can select "file/load layout …" and select one.
(there are some example-layouts in "<View>/GPF/cfg" and
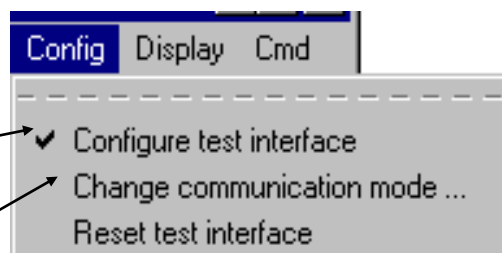"<View>/GPF/util/xpanel/layouts")
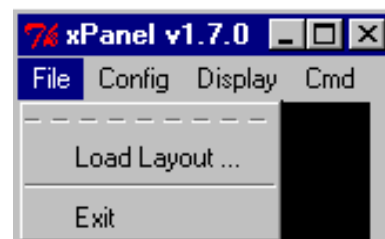
Now you can press the buttons and if communication with stack
works its display requests should result in a new screen-picture in
the xPanel-window.
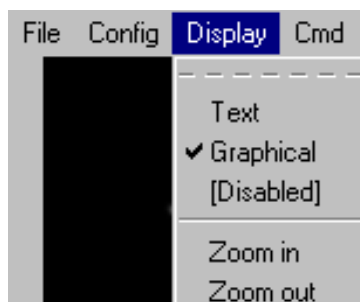
If not you might have to switch the
display-type (textual, graphical or off).
In the "Display" menu you can set the size of the graphical screen,
too.
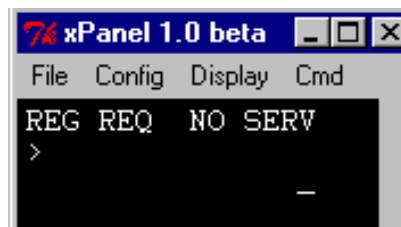
If communication doesn't work you can try to change commu-
nication mode from the "Config"-menu. Therefore you have to
enable test interface configuration at first. (Per default xPanel
does not configure it but lets this work do other tools like
PCO)
Then the mode may be chosen inside a dedicated dialog:
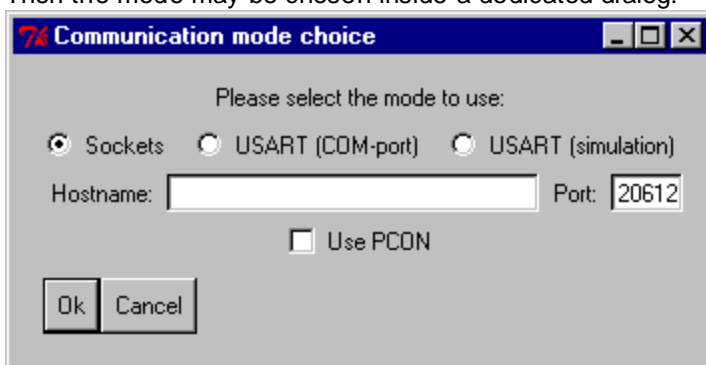
Currently the Frame supports Sockets, real USART using a COM-port and simulated USART via
shared memory. For each mode you can specify special parameters and decide, whether PCON shall
be used (if your stack is using PCON for communication)

For real USART you may e.g. select the
COM-port to use and more parameters like
baudrate and flow control value.
All parameters can be specified in the ini-
file, too (see 2.3).
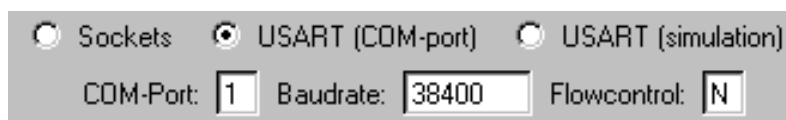
If communication over serial port stops working you can try to reset the serial driver from the "Config"-
menu. Another possibility is to restart the whole xPanel application.

All settings you choose while working with xPanel (even the position of the window) will be stored in
the used ini-file (see 2.3) when you exit xPanel.

2.3 Command line parameters and ini-files

Inside a ClearCase vob the convenience batch file xpan.bat may be used with command line param e-
ters as follows:

- h   … display all parameters
- tst_com{1|2}   … load default configuration files for communication via test interface on com
port 1/2
- at_com{1|2}   … load default configuration files for communication via at interface on com
port 1/2
- sim   … load default configuration files for communication via shared memory
- ti_mux   … load default configuration files for communication via TI multiplexer

At the command line of xpanel.exe itself you can specify some environmental options for xPanel. You
can select between the following possibilities:

- -h   -> usage-message
- -l <layout name>   -> program will use the specified layout (see 3.1)
- -m <usart-mode>   -> program will use the specified usart mode (REAL|SIM)
- -i <ini file>   -> program will parse the specified ini file
- -s[end] <key code> [<press time in ms>]
                                  -> program will send specified key stroke to the test interface (fi-
                                  nally the PS) … optionally the milliseconds between
                                  press/release can be specified
- -c[lean]   -> cleans the text display

If you don't give any parameters the default ini-file "xpan.ini" will be parsed if one exists (searched in
current directory and "..\cfg"). In an ini-file only lines of the following format will be interpreted:
<whitespace><value>

An overview of the available parameters follows:

- layoutdir   <layout directory>
- layout   <layout name> (see 3.1)
- initpri   <file with initial primitives to execute at beginning> (see 0)
- zoom   <zoom level> (the higher the bigger the display will be)
- set-comm   {0|1} (specify here if xpanel shall set tst configurations)
- STX   <STX-mode> (0 or 1)
- comport   <COM-port number>
- usartmode   {REAL|SIM|SOCKET}
- hostname   <name of the host for socket connection> (can be empty)
- socket_port   <port for socket connection> (default: 20612)
- flowctrl   Defines the mode of flow control. The characters 'N', 'R', 'D', 'P' and 'V' are accepted.

<control flow>	Type of flow control
N	None
R	RTS/CTS
D	DTR/DSR
P	None, DTR line enabled, serial interface pro-vides power supply for external devices
V	None, DTR and RTS lines enabled, serial interface provides power supply for external devices

- windim   .. set automatically
- palette   .. file containing a color table (see 2.4.3)
- pcon   <PCON-mode> (0 or 1)
- extdspl_data_frequency
                .. frequency in ms xPanel will request graphical display data (see [XPAN+])

You can find examples in the standard xpan.ini files in gpf/cfg or in gpf/util/xpanel/cfg.

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2.4 Working with xPanel

2.4.1 Sending of SYSTEM-Primitives

In the "Cmd"-menu you have to points for sending SYSTEM-
primitives – either directly or by loading them from a file.

A SYSTEM-primitive consists of a re-
ceiver and a primitive body. You can
input both directly by choosing the Menu
entry "Cmd/Input primitve …".

Under "Cmd/Load primitve …" it is possible to load a ASCII-file formatted like this:

<receiver>
<prim body>
<receiver>
<prim body>
    :

For example:
MMI
CONFIG KEY_SEQUENCE= LEFT
MMI
CONFIG KEY_SEQUENCE= DOWN

2.4.2 Input of AT-Commands

In the "Cmd"-menu you have to points for sending AT-
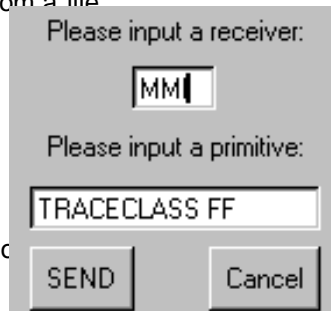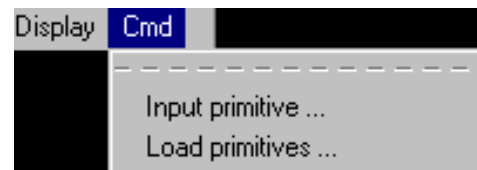commands – either directly or by loading them from a file.

An AT-command is just a string like "AT+…".
You can input such a line directly by choosing the
Menu entry „Cmd/Input AT command …".

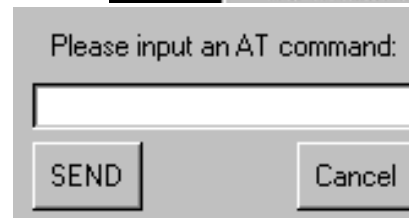Under „Cmd/Load AT commands …" it is possible to load AT-lines from an ASCII-file formatted like
this:

<at-string>
<at-string>
<at-string>
    :

For example:
AT+CSCA=491710760000*145
AT+CMGS=491712002400*145*Test__das_ist_MO_SMS

2.4.3 Using graphical screen with color table

XPanel supports the display of graphical screen informations received from the the connected target. See [XPAN+] for detailed information about the supported interface.

Depending on the used bits per pixel it either takes colors from a color table or calculates true color values (bpp>=16, see [XPAN+] for detailed description of bit-usage). A color table can be specified in the ini-file (see 2.3). Currently only the JASC-format is supported as it can be exported e.g. from the PaintShop application. Such a „.pal"-file is just an ASCII-file of the following style:

```
JASC-PAL                    … fix string
0100                        … fix number
<count>                     … count of colors in file (e.g. 256)
<RGB-entry 0>
<RGB-entry 1>               … -count- entries with RedGreenBlue-information separated by blanks
(e.g. 0 255 23)
     :
<RGB-entry count>
```

All numbers are in decimal format.

If no color table is specified xPanel will try to use „default256.pal".
If no table can be found anyway, levels of grey (between RGB(0,0,0) and RGB(255,255,255)) will be used.

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3 Layout development

3.1 Basics

To develop a special mobile layout you have to get detailed informations about all the keys – their location, the text/graphics on them and the associated function.
The next step is to modify the template tcl-file (xpan_lo_tmpl.tcl) and rename it to <name>_lo.tcl where <name> stands e.g. for the name of the company you develop the layout for.
Now this name can just be passed to xPanel as a parameter (e.g. xpan –l <name>) or specified in your ini-file (see 2.3) and the new layout will be used. Another option is to load the layout from the menu of xPanel (file/load layout …).

3.2 Editing the template

After copying the „xpan_lo_tmpl.tcl" to "<name>_lo.tcl" you can modify the constants in the following parts of the layout file:

- *Display colors*

Here you can specify the fore-and background colors of the text display.

- *Key count*

Here you can specify the count of keys in a row/column of your mobile.

- *Key IDs*

Here you can specify the mapping of key names to IDs. Usually no changes are necessary.

- *key distribution*

Here you can specify how the key are distributed on your mobile. Where no key exists use $KEY_NOKEY.

- *Key labels*

Here you can specify strings as labels of your keys. Where no key exists or where you want to provide an image use an empty string.

- *Optional Key images*

Here you can specify names of image files (Bitmaps) which will be uses instead of a string as labels of your keys. Where no key exists or where you want use a label string specify an empty string.

- *Key sizes*

Here you can specify the sizes of your keys. Just look at the given examples and "trial and error" until you are satisfied. Where no key exists use "0" (it will be ignored anyway).

- *Key positions*

Here you can specify the relative positions of your keys using sticky-strings. You can choose from "w" (west), "e" (east), "n" (north) and "s" (south) to indicate that a key should stick at a side, or you can center it by using "". Where no key exists use an empty string (it will be ignored anyway).

- *Key reliefs*

Here you can specify the relief type of the keys. One of the following constants may be used: raised, sunken, flat, ridge, solid, groove. Just try and decide what you like.

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4 Known problems and future tasks

This paragraph is meant to show which bugs are already found (but not removed yet) and to provide an impression of future plans concerning this product.

4.1 Known bugs

- XPanel does not remember its position/size correctly sometimes

4.2 „Soon implemented"

- the file dialogs should „remember" the last chosen path
- Online-Help

4.3 „Nice to have "

- more extensive possibilities of command execution – more automatization
- a recording of button-presses shall be possible

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Appendices

A. Acronyms

DS-WCDMA   Direct Sequence/Spread Wideband Code Division Multiple Access

B. Glossary

International Mobile Tel-ecommunication 2000 (IMT-2000/ITU-2000)

Formerly referred to as FPLMTS (Future Public Land-Mobile Telephone System), this is the ITU's specification/family of standards for 3G. This initiative provides a global infrastructure through both satellite and terre-strial systems, for fixed and mobile phone users. The family of standards is a framework comprising a mix/blend of systems providing global roam-ing. <URL: http://www.imt-2000.org/>

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