

MOBILE COMPACTRIO™ APPLICATIONS



WITH cRIO Gxxx MOBILE MODULES

- GPS
- GSM
- IRIG-B Connector for Synchronization



How Your COMPACTRIO™ GOES MOBILE

Answers to the following questions will be given in this flyer:

- Which components are required to build up a mobile control and data logging CompactRIO system?
- How to build up a mobile CompactRIO data logger?
- Which hard- and software is required to use cRIO Gxxx Mobile modules?
- How to program a mobile CompactRIO application?

cRIO Gxxx Mobile Modules

The following cRIO Gxxx Mobile modules are available:

- Gxxx Combo modules support GSM and GPS functionality, Gxxx Combo modules additionally provide a synchronization output (PPS),
- GSM modules support GSM functionality,
- the GPS modul supports GPS functionalit and provides a free programmable time synchronization output (PPS),
- the GPSIB module supports GPS functionality and additionally provides an IRIG-B compliant time synchronization output.

The GPS modules allow a time telegram with a data rate of 1 Hz up to 4 Hz depending on the module type. GPS modules additionally route the PPS signal to the backplane to allow the synchronization of other CompactRIO systems. The GPSIB module supports a higher update rate of up to 8 Hz and provides time information in IRIG-B format.

Measurement and Control Hardware

Typically a CompactRIO Mobile system consists of:

- a CompactRIO chassis with FPGA backplane und RT controller
- IO modules with signal conditioning and connectors
- a cRIO Gxxx Mobile module
- external equipment e.g. antennas etc.



The I/O modules can be combined to customer needs, depending on the signals to be measured, resolution and range.

Besides standard I/O modules special modules for the connection of different CAN busses as well as modules for precise timing measurements are available.

Gxxx Starter Kit

Start the development of your application with the Gxxx Starter Kit

- Gxxx Combo module with power cable, software tool kit, and documentation
- GSM antenna
- GPS antenna

Please choose the Gxxx Starter Kit applicable for your solution. The development platform is Microsoft® Windows®.



- Status LED
- External power supply for GSM mode
- Synchronisation output for PPS or IRIG-B signals
- Plug for GPS antenna
- SIM card reader
- Plug for GSM antenna

Antennas

The cRIO Gxxx Combo modules require two different types of antennas. One for receiving GPS signals the other for receiving and sending GSM signals.

S.E.A. provides antennas for different ranges of application like indoor or outdoor usage, directional or omnidirectional, stationary or mobile. Special train or ship antennas are also available. Please check our cRIO-Mobile accessories website for available antennas:

www.sea-gmbh.com/crio



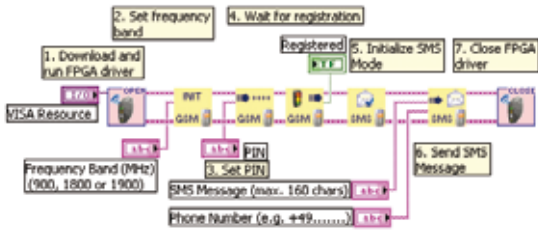
CompactRIO system with Gxxx Module with GPS antenna connected, a DigitalOut, a CAN Module (both National Instruments) and a Gxxx module (S.E.A.)

(This picture is aggregated for demonstration purpose only)



The Programming of cRIO Mobile Modules

A cRIO Mobile module comes with a software tool kit providing the GPS and GSM functionality by API. The programming language is National Instruments LabVIEW™. You can find several examples showing how to use the APIs. There is also a GSM server software packet available providing server functionality for more complex applications.

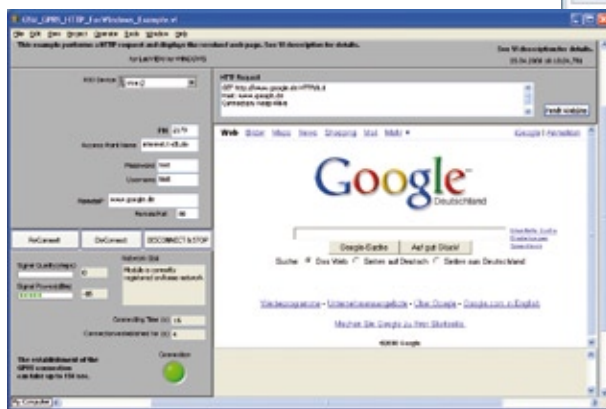


The image above shows an example for sending and receiving an SMS message within five simple steps:

1. load and start the FPGA driver
2. initialize the GSM modules
3. initialize the SMS service
4. receive or send a message
5. close the FPGA driver



The LabVIEW palettes contain API functions for special GPS and GSM functionality as well as commonly needed functions.



Example front panel for calling an external website by the cRIO system

cRIO Remote Server Software

Measurement data, monitored data or events are transmitted to a server computer using the cRIO Mobile capabilities. The server software allows the processing of some few up to several hundred cRIO Mobile clients allowing automated data transfer and interaction between the clients and server.

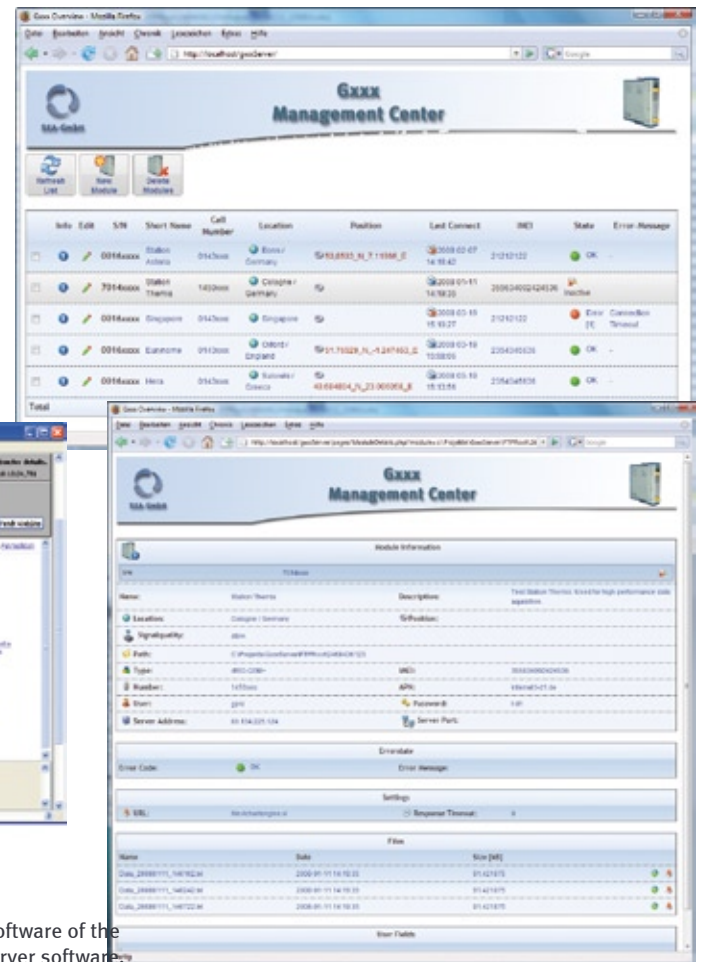
The GSM server contains the server kernel and cRIO API functions to allow:

- the initialization of the cRIO Mobile module,
- the receiving, processing and sending of data,
- the encrypting and decrypting of data,
- the monitoring of the status of the system,
- the transmission of data either by a cyclic trigger, an event trigger, or manually triggered,
- the statistical analysis of data.

Data is transmitted by Web secure using encrypting algorithms (e.g. AES) on module and server site.

The transmission history can be monitored via web browser. Transmitted data is stored in dedicated directories on the server. This allows to view the history of all relevant data.

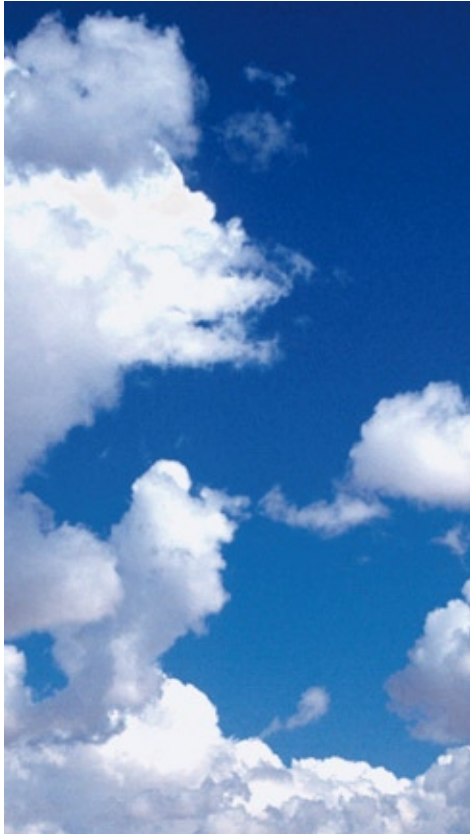
The GSM server software is currently available for the operating systems Microsoft® Windows® and Linux OS.



Configuration software of the Mobile GSM server software



Overview



cRIO Mobile				
Modules	cRIO Gxxx Mobile	cRIO GSM Mobile	cRIO GPS Mobile	cRIO GPSIB Mobile
Order no.	60000000	60000002	60000001	60000003
GSM				
# of supported GSM bands	4	4	-	-
Frequency [MHz]	850, 900, 1800, 1900		-	-
GPRS	•	•	-	-
EDGE (Enhanced Data Rates for GSM Evolution)	•	•	-	-
Classes	Class 12	Class 12	-	-
SIM card reader	•	•	-	-
SIM lock function	•	•	-	-
SIM lock plate	Optional		-	-
GPS				
Data rate time telegram	4Hz	-	4Hz	4Hz (opt.8Hz)
Synch output connector (PPS= PulsePerSecond)	•	-	•	•
Programmable pulse	•	-	•	• (/)
Synch routing to backplane	•	-	•	•
IRIG-B option	/	-	/	•
Technical Data				
Operating temperature range [deg C]	-30...+65	-30...+65	-40...+80	-40...+80
Operating voltage [V] (front power connector)	7-30V	7-30V	/	/
Operation current [A _{rms}] mean at 12V	0,320	0,320	/	/
Operation current [A] peak at 12V	1,5	1,5	/	/
Operating voltage [V] (backplane)	5	5	5	5
Operating current [mA] mean (backplane)	60	9	60	60
Size [mm]	70x213x87			
Weight [g]	175	170	170	175
Software				
Software Development Package for LabVIEW 8.x	•	•	•	•
Firmware flashable	•	•	•	•

• = included; / = not available in this series; - = not available

Subject to technical changes.

How it Works

Data transfer within a GSM network

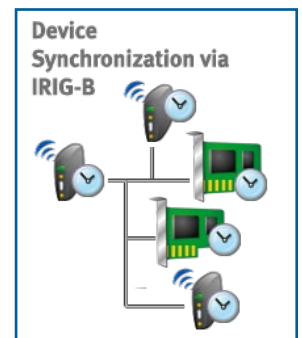
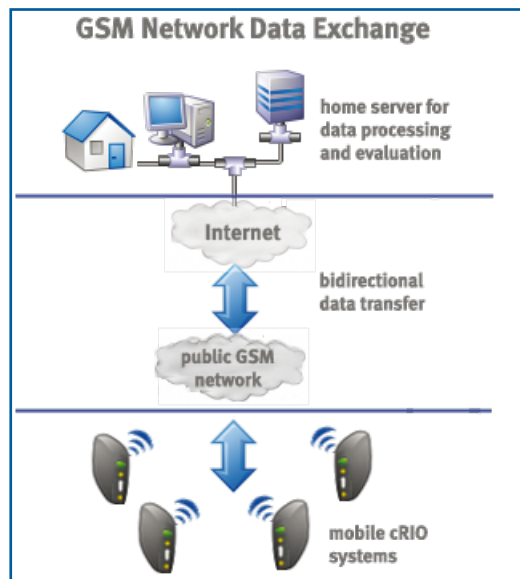
Gxxx Mobile modules establish a GSM connection to the public GSM network service. Data is transmitted using the TCP/IP Internet standard, to which the server (a PC or workstation) is connected. This task is performed by a LabVIEW program or the cRIO server software running on the server.

Time synchronization of IRIG-B devices

GPSIB modules provide an exact time information using IRIG-B format.

Determination of the GPS position

cRIO Gxxx modules provide the exact determination of the module's (more precisely the antenna's) position using the integrated 12/16 channel GPS receiver, in the future also using the Galileo system.



Service and Support

S.E.A. will support you in every step during the development process, beginning with the selection of the hard- and software components, followed by OEM software development for CompactRIO systems or data management solutions on an server computer up to the development of customer specific hardware.

We design measurement systems for stationary or mobile applications based on the CompactRIO platform of National Instruments.



Please visit our website for further information:

www.sea-gmbh.com/crio

S.E.A. Science & Engineering
Applications Datentechnik
GmbH

Linder Höhe
51147 Köln

Phone: +49 22 03 / 9 80 07 - 0
Fax: + 49 22 03 / 9 80 07 - 14

Internet: www.sea-gmbh.com
E-Mail: crio@sea-gmbh.com



left:
cRIO Gxxx,
cRIO GSM, and cRIO
GPS module

overleaf:
cRIO system with
S.E.A. GSM,
WLAN, Gxxx and LIN
modules including
antenna