

CipherLab **User Guide**

1663GPS Barcode Scanner
Software Development

Version 1.00



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RELEASE NOTES

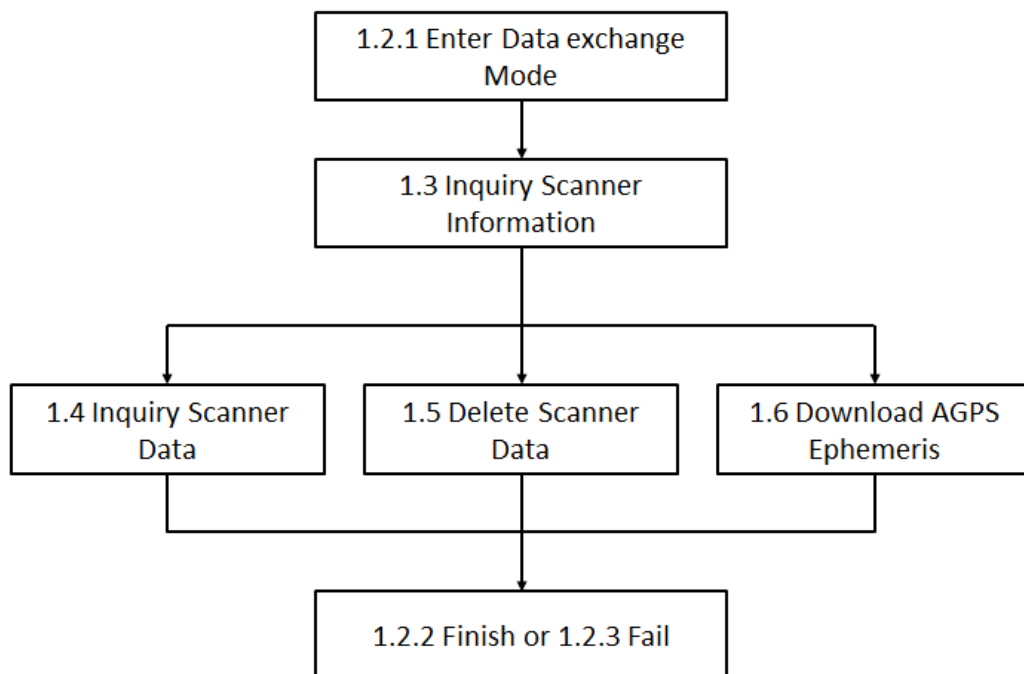
Version	Date	Notes
1.00	Apr. 15, 2015	Initial release

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SCANNER COMMUNICATION PROTOCOL

1.1 THE COMMUNICATION FLOW CHART



1.2 COMMUNICATION COMMAND

- ▶ GPS module is disabled when the scanner enters communication mode.
- ▶ When trying to update the ephemeris, the GPS module will then be enabled; otherwise, the GPS module won't be enabled until quitting communication mode.

1.2.1 ENTERING COMMUNICATION MODE

Command from Host	Response from Scanner	Descriptions
#@SmartRead\r		
	ACK\r	

1.2.2 NORMAL QUITTING

Command from Host	Response from Scanner	Descriptions
DONE\r		
	DONE\r	

1.2.3 ERROR CAUSING QUITTING

Command from Host	Response from Scanner	Descriptions
FAIL\r	--	

- ▶ When an error occurs, the scanner LED indicator flashes in red after receiving the "FAIL\r" response sent from the host.

1.3 INQUIRING SCANNER INFORMATION

Command from Host	Response from Scanner	Descriptions
SYSINFO\r		
	ACK\r	
	<i>SysInfo</i>	
ACK\r		

1.3.1 FIELDS OF THE SYSINFO

Byte Index	Field	Descriptions
0~15	<i>Serial Number</i>	9~13-byte characters + NULL
16~27	<i>Reserved</i>	12 bytes NULL
28~39	<i>Kernel Version</i>	8~9 characters + NULL
40~51	<i>Program Version</i>	8~9 characters + NULL
52~87	<i>File Name</i>	Max. 35 characters + NULL
88~91	<i>Record Count</i>	32-bit integer, data record count on the scanner; Index 88: LSB, Index 91: MSB
92~100	<i>AGPS Version</i>	String, version of ephemeris on the scanner; "YYMMDDPR\0" YY: year, MM: month, DD: day, P: period, R: resolution
101~127	<i>Reserved</i>	reserved

After receiving the system information above, the host then

- ▶ realizes which file is to be uploaded according to the File Name field.
- ▶ realizes how many data records to be uploaded according to the Record Count field.
- ▶ can tell whether the ephemeris needs to be updated according to the AGPS Version field.

1.4 INQUIRING SCANNER DATA

Command from Host	Response from Scanner	Descriptions
DATA# <i>file name</i> \r		The '#' sign is followed by a file name. Wrong file name will cause the scanner to respond with 'NOFILE\r'.
	ACK\r or NOFILE\r	
	<i>Record data</i>	During data uploading, if the host sends the 'NAK\r' response, the scanner has to upload the current data record again.
ACK\r or NAK\r		After the last data record is uploaded, the scanner responds with 'OVER\r'.
	OVER\r	
DATADEL# <i>file name</i> \r or WRITE#AGPS_YYMMDDPR\r		Having accepted the 'OVER\r' response, the host compares the received record count with the Record Count value the system info keeps. If both the record counts are equal, the host proceeds to delete the file, download the ephemeris, or quit the communication mode. If the record counts are not equal, the host sends 'FAIL\r' to the scanner whose LED indicator will then flash in red quitting the communication mode.

1.4.1 FIELDS OF THE RECORD DATA

Byte Index	Field	Descriptions
0	<i>Sequence number</i>	Ranging from 0~9 (when greater than 9, it's reset to 0)
1~2	<i>Payload length</i>	A 16-bit integer; the value is always n+7. Index 1: LSB, Index 2: MSB
3~8	<i>Data Sequence</i>	6 characters, the indicator of data sequence
9	<i>Space</i>	The separator between data sequence and data
10~(n+10)	<i>Data</i>	n is the data length of each record
n+11 n+12	<i>Checksum</i>	Accumulated from index 1 to index n+10 and saved as a 16-bit integer. Index n+11: LSB, Index n+12: MSB
n+13	\r	0x0d
n+14	0	Null

1.5 DELETING SCANNER DATA

Command from Host	Response from Scanner	Descriptions
DATADEL# <i>file name</i> \r		The '#' sign is followed by a file name. Wrong file name will cause the scanner to respond with 'NOFILE\r'.
	ACK\r or NOFILE\r	

1.6 DOWNLOADING AGPS EPHEMERIS TO SCANNER

Command from Host	Response from Scanner	Descriptions
WRITE#AGPS_YYMMDDPR\r		The host sends the command to update the ephemeris.
	ACK\r or NOFILE\r	When accepted, the scanner enables the GPS module and responds with 'ACK\r'; otherwise, it sends 'NAK\r'.
<i>ephemeris</i>		Having accepted the 'ACK\r' response, the host begins sending the ephemeris.
	ACK\r or NAK\r or ABORT\r	The scanner sends 'ACK\r' each time it finishes receiving a packet and forwarding it to the GPS module. If an error occurs, the scanner sends 'NAK\r'. If ephemeris downloading fails to continue, the scanner sends 'ABORT\r'.
OVER\r		After receiving 'ACK\r', the host proceeds to transmit the next packet; as for 'NAK\r', the host resends the current packet. The host sends 'FAIL\r' and stops transmitting if 'ABORT\r' is received. The host sends 'OVER\r' telling the scanner that the entire ephemeris data is completely transmitted.
	ACK\r	The scanner will then update the ephemeris version information after receiving 'OVER\r'.

1.6.1 FIELDS OF THE EPHEMERIS

Byte Index	Field	Descriptions
0	<i>Sequence number</i>	Ranging from 0~9 (when greater than 9, it's reset to 0)
1~2	<i>Payload length</i>	A 16-bit integer; the value is always n+5. Index 1: LSB, Index 2: MSB
3~(N+3)	<i>AGPS Data</i>	N is the data length of AGPS ephemeris for each transmitted record. The regular length of N is 512 except the last data record.
N+4 N+5	<i>Checksum</i>	Accumulated from index 1 to index N+3 and saved as a 16-bit integer. Index N+4: LSB, Index N+5: MSB

GETTING AGPS EPHEMERIS

The developed application should be capable of downloading ephemeris regularly from the website of the GPS module vendor.

2.1 URL SETTINGS

To create the URL settings, please follow instructions described below.

<http://<PrimaryServer>or<SecondaryServer>/GetOfflineData.ashx?token=<ServerToken>;gnss=<GNSS>;period=<Period>;resolution=<Resolution>>

Parts	Descriptions
<PrimaryServer>	offline-live1.services.u-blox.com
<SecondaryServer>	offline-live2.services.u-blox.com
<ServerToken>	TvSpPZZh9EyewvOUxLkogg
<GNSS>	gps (GPS only); glo (GLONASS only); gps,glo (GPS + GLONASS)
<Period>	1 ~ 5 (weeks, meaning data of weeks stored in the ephemeris)
<Resolution>	1 ~ 3 (days, meaning how often each satellite appends the ephemeris data)

Note: The ephemeris is to expedite scanner positioning. Settings of 'period=5' and 'resolution=1' will be the best solution; however, the file size is the biggest.

Below is a URL example for downloading the ephemeris:

<http://offline-live1.services.u-blox.com/GetOfflineData.ashx?token=TvSpPZZh9EyewvOUxLkogg;gnss=gps,glo;period=5;resolution=1>

The downloaded file name is 'mgaoffline.ubx' by default. It's recommended changing the file name to the format of 'YYMMDDPR.ubx' so that it can be compared with the AGPS Version field of the SysInfo.

Date Format	Descriptions
YY	Year (00~99)
MM	Month (01~12)
DD	Day (01~31)
P	Period (1~5)
R	Resolution (1~3)

RECOGNIZING THE SCANNER

The host uses a different Win32 API to recognize devices depending on the OS launched.

OSes	API
<i>Win XP</i>	SetupDiGetDeviceRegistryProperty() with SPDRP_LOCATION_INFORMATION
<i>Win 7/8/8.1/10</i>	SetupDiGetDevicePropertyW() with DEVPKEY_Device_BusReportedDeviceDesc

A successful call should return the '1663GPS Scanner' string when a scanner is recognized.