

Garmin RGN Firmware Update

File Format

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Garmin RGN Firmware Update File Format

Filename extension *.rgn for “Region”.

Important: There are RGN subfiles within Garmin IMG files which have a completely different structure and purpose.

This documentation is based on own research and the sources listed in the references section.

Basic data types

All values are serialized in little-endian byte order (least significant byte first).

Type	Length	Description
byte	1	8 bit unsigned integer (range 0 .. 255)
ushort	2	16 bit unsigned integer (range 0 .. 65535)
uint	4	32 bit unsigned integer (range 0 .. 4294967295)
char	1	ASCII character (see [3])
string	1..n	0-terminated string (may be empty).

Version:

A byte or ushort where the value is calculated as major version x 100 + minor Version.

E.g. 0x0064 = 100 = V1.0

General file structure

Version Identification Record
List of Records (without holes)

Version Identification Record

Type	Content
char[4]	File ID = “KpGr” This is ‘RGNPKG’, shortened and backwards
ushort	Format version Seen value: V1.0

General record structure

Type	Content
uint	Record Length in byte
char	Record ID Identifies the record content. See table below.
byte[Record Length]	Record Content

Record ID values:

Value	Meaning
'D'	Data version
'A'	App version
'R'	Region

Sequence of records

'D', 'A', 'R'+

+ = at least one occurrence

Data version record (ID='D')

Length = 2.

Type	Content
ushort	Data version Seen value: V1.0

Application version record (ID='A')

Length = varies.

Type	Content
ushort	Application version
string	Builder
string	BuildDate
string	BuildTime

Seen values:

Application version	Builder	BuildDate	BuildTime
V2.0	"SQEQA"	"Mon dd yyyy"	"hh:mm:ss"
V2.0	"SQA"	"Oct 25 1999"	"14:16:13"
V2.0	"build"	"Oct 1 2008"	"11:26:12"
V2.0	"sqa"	"Feb 23 2009"	"18:23:01"
V2.0	"build"	"Dec 15 2009"	"11:45:54"

Region record (ID='R')

Length = varies.

Type	Content
ushort	Region ID See table below.
uint	Delay in ms Seen values: 0, 500
uint	Region size (is record length - 10)
byte[Region]	Content of the firmware region

Type	Content
size]	

Region ID values:

Value	Meaning
0	Amongst others, RGN file
1	?
2	?
3	IMG file
5	?
10	dskimg.bin (IMG file format)
12	boot.bin
14	fw_all.bin (In DeltaSmart_350.rgn, the content is again a RGN file which contains the actual firmware in its region 14.)
16	logo.bin
17	Voice (IMG file format or other)
78	ZIP, IMG or RGN file
80	?
81	?
82	?
85	fw_all2.bin
86	Texts (e.g. in Text_ApproachS40_Chinese_260.rgn)
93	gmaptz.img (Timezone, IMG file format)
97	Speech recognition data (ASR or SRD)
132	? Always starts with the six bytes 04 00 00 0C 00 00, optionally followed by another 4 bytes (different content)
146	SQLite format 3, DTF = D? Toll Fees
148	SQLite format 3, DTF = D? Toll Fees
162	?
245	GCD or RGN firmware update file
246	?
247	?
248	?
249	Display firmware
250	?
251	WiFi firmware, GCD firmware update file
252	?
253	GCD firmware update file
255	pk_text.zip (ZIP file with help texts), GCD firmware update file, or XML file

Found in sources, but not seen yet:

Chunks, Signature:

```
static struct vr_header_v2 {
    unsigned int virtual_region;
    unsigned int header_len;
    unsigned int target;
    unsigned int offset;
    unsigned int chunk_size;
    unsigned int sig_size;
}
```

```
} header;

struct pgp_region_hdr {
    unsigned int virt_region_type; /* Type of virtual region */
    unsigned int header_len;      /* Length of this header */
    unsigned int target;          /* Product-specific field to specify different
                                areas of flash */
    unsigned int offset;          /* Offset within this flash target */
    unsigned int chunk_size;      /* Size of each signed data chunk */
    unsigned int sig_size;        /* Size each signature is padded to */
}__attribute__((packed));
```

References

Used sources of information

- [1] Doremi RGN Parser <https://github.com/doremi/rgn>
- [2] RGN_Tool http://www.gpspassion.com/forumsen/topic.asp?TOPIC_ID=137838,
https://web.archive.org/web/20170718095456/http://turboccc.wikispaces.com:80/RGN_Tool

Standards and specifications

- [3] ISO/IEC 646:1991, Information technology – ISO 7-bit coded character set for information interchange

Sources of sample files

- [4] Garmin Marine Device Software Updates <http://www8.garmin.com/support/software/marine.html>
- [5] <http://www.gmaptool.eu/pl/content/trail>
- [6] <http://gpsrchive.com/>
- [7] <https://wiki.ubuntuusers.de/Garmin/Firmware/>
- [8] <http://www.tramssoft.ch/DOWNLOADS/GARMIN/>