P4dragon Firmware-Update

Description of the modifications / improvements

Firmware Version 2.20.00 (09/2015)

SCS Spezielle Communications Systeme GmbH & Co. KG

Firmware Update Information on P4dragon DR-7X00

(**P4dragon** firmware 2.10.00, September 2015)

1. General information

The firmware 2.20 replaces the firmware 2.10 (and subsequent beta versions) and provides APRS[1] capabilities for stand-alone position beaconing as well as autonomic APRS digipeating. Some other improvements and corrections round off the new firmware.

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[1] APRS is a registered trademark of the APRS Engineering LLC, USA.

2. New features

2.1 APRS

General information

As from firmware 2.20 the P4dragon modems offer "APRS" as an additional operating mode.

The modems will allow configuration as a stand-alone beacon as well as an APRS-digipeater. There can be a manually set static position ("Fix-Position") transmitted, as well as a position given by a connected GPS-receiver.

In the operating mode "GPS" the beacon interval can be automatically controlled. This "Automatic Beaconing" also covers additional fill-in beacon transmissions caused by large or rapid direction changes, as well as the possibility to automatically shut off the beacon when inside the "Local Range" (300 m around the defined Fix-position).

If APRS-digipeating is activated, the P4dragon works as a WIDEn-N-digipeater ("New Paradigm")

Commands

APRS
Value range: 0-2
Default: 0

Example: APRS 1 <Enter>

This command is available in the pac:-menu and can be accessed from the cmd:-menu by using the "pac"-prefix, e. g. "cmd: pac APRS 1<Enter>". Alternatively, the P4dragon can be switched to pac:-menu first. This can be performed using the PAC-command.

The APRS-command works as a "Main Switch" for the APRS-beacon. Depending on the set parameters, the beacon is turned off, uses GPS or Fix-position data.

Input of the APRS-command without any argument causes (apart from the output of the actual set parameters) the transmission of a beacon (as long as MYcall and position are available). This allows testing of the settings.

The individual functions:

0:      OFF, APRS-beacon is switched off.

1:      GPS, APRS-beacon transmits the GPS-position data, if available. (GPS-receiver must be connected and operational).

2: FIX, APRS-beacon sends the fixed position data if available. (Adjustable with "APRS POsition").

For the sender callsign, the APRS-beacon uses the MYcall from the virtual channel 0 or the special APRS-Mycall (adjustable with "APRS MYcall <MYCALL> see below). The special APRS-Mycall then has priority.

If neither the special APRS-Mycall nor the Mycall of the virtual channel 0 has been defined, then no APRS-beacon can be transmitted!

These settings must therefore always take place. The Mycall of the virtual Packet Radio-channel 0 is however automatically entered on setting the global modem-Mycall (cmd: MYcall, which is also needed for PACTOR!) and is thus normally correctly set as long as one has carried out the "normal" MYcall-command in the cmd:- menu.

The APRS-command allows in addition to its main switch function, the setting of various APRS-relevant parameters. This occurs by inserting "Sub-commands". The following "Sub-commands" are possible:

ALTitude, AUTOEvery, COmment, Digipeat, LOcal, MICe, MYcall, PAth, POsition, SHort, STatus, STONE, SYmbol, TImer.

Example: APRS SHort 2 <Enter>

Sets the Short-parameter to 2 (MIC-E), see below.

The individual Sub-commands are described here as follows.

ALTitude
Value range: 0-1
Default value: 1 (ON)

Activates (1) or de-activates (0) the insertion of course/speed/altitude information in the commentary field with uncompressed and BAS91-beacon in GPS-mode. If this information should be transmitted next to the position in such beacons, then the ALTi-tude-parameter should be set to 1. The alternative possibilities offered in the APRS-protocol for the transmission of this information (at least in part) are not supported by the P4dragon.

If the beacon transmission should be kept as short as possible, and course/speed/altitude have no or only a small relevance, then the parameter can be set to 0. This is recommended for example by RPR-beacons on shortwave.

AUTOEvery
Value range: 100-10000 [meters]
Default value: 1000

Defines the distance between automatically chosen transmission locations ("Beacon-positions") with GPS-operation (APRS 1) and "APRS Timer"-setting 0 (see below for "APRS Timer"). If the "APRS Timer" parameter is set to 0, then by using the default setting, independent of the speed then for example, a waypoint appears every 1000 m on http:aprs.fi.

COmment
Value range: - or text with max. 40 characters
Default value: NONE (No commentary defined)

Defines the comment text which is inserted in every APRS-position datagram (for Status-packets there is a special text, see below). Here, for example, a point for point description of the system can be offered: "DR-7800, 20W, Dipole". The maximum length of the comment is 40 characters. Longer comments are refused with an error message. A "Minus-sign" (-) as comment resets the commentary to "NONE" i.e. erases it.
APRS comments should be held as short as possible, as they considerably extend the APRS-datagram, which contributes to higher channel occupation.

Digipeat
Value range: 0-2
Default value: 0

Activates (1, 2) or de-activates (0) the P4dragon's APRS-digipeater function. If the Digipeat-parameter is set to 1, the modem operates as a WIDEn-N-digipeater ("New paradigm"). Furthermore, if the parameter is 2, WIDEn with SSID 0 will be replaced by the own mycall from PR-channel 0, if defined ("Trace function").

LOcal
Value range: 0-1
Default value: 1

Activates (1) or de-activates (0) the so-called "Local Range" function. With an activated "Local Range" function, the beacon is suppressed in GPS-operation, as long as the actual position is within a radius of approx. 300 m from the Fix-Position. (The Fix-Position must

have been previously defined in order that this function is available. See below "APRS POsition").

The "Local-Range" function offers the advantage that beacons are only transmitted when one is really "on the go" and not when the car ignition is turned on in the garage or at home etc.).

MICe
Value range: 0-15
Default value: 0

Defines the MIC-E message type. This setting is only relevant when the "APRS Short" parameter is set to 2 (MIC-E). Then the following MIC-E message types are possible:

0: Off Duty, 1: En Route, 2: In Service, 3: Returning, 4: Committed, 5: Special, 6: Priority, 7: EMERGENCY, 8-15: Custom 8 - Custom 15.

The value 7 may only be used in an absolute emergency !

MYcall
Value range: - (NONE) or up to a 6-character callsign with SSID if applicable.
Default value: NONE

Defines the special APRS-Mycall, i.e. the source callsign of the sender with which the APRS-Datagram was transmitted.
If the APRS-Mycall is not defined ("NONE"), then the P4dragon uses the Mycall which is stored in the virtual PR-channel 0 ("Global Mycall for PR"). On first use of the normal Mycall command (in the cmd:- menu,) e.g. for PACTOR, it is also set to the value entered.

ATTENTION: If neither the special APRS-Mycall nor the Mycall on the PR-channel 0 have been set, then no APRS-datagram can be transmitted.

PAth
Value range: APRS-target callsign and up to 8 digipeater callsigns, each max. 6 characters, if required with SSID.
Default value: APRS via WIDE1-1

Defines the AX.25-transmission path inclusive of the target callsign and maximum 8 Digipeater callsigns, if required each with SSID. Between the target callsign an (optional) digipeater list can "v" or "via" be inserted for easier reading.

POsition
Value range: XXXX.XXS/N YYYYY.YYW/E
Default value: NONE

Allows the input of the position for "Fix-position" operation (APRS 2, see above). In addition the position setting serves as setting for the "APRS Local" function, see above. The position must exactly match the given "Latitude Longitude" format given, i.e. degree input including leading nulls directly followed by the minute input with two decimal trailing positions and finally the direction. All other input formats will be refused with an error message.

Example:
pac: APRS PO 4810.30N 01030.25W <Enter>

A Fix-position can only be replaced by a new Fix-position, and not just completely erased.

SHort
Value range: 0-2
Default value: 2

Defines the compression or the format of the position information in an APRS-datagram.

0: Uncompressed transmission, position data is also readable in the PR-monitor.
1: BASE91-format, good compression, commonly used format.
2: MIC-E-format, best compression, recommended format.

For the lowest channel occupancy, the MIC-E-format should be used. The uncompressed format is recommended to be used only for testing.

STatus
Value range: - (NONE) or text with max. 62 characters.
Default value: NONE (no status text defined)

If the status text has been defined, it is transmitted after every Xth position-datagram as an APRS-status beacon. X is defined with the command "APRS STONE", see below. In the status it is possible to set occasional additional information which can be scattered into the APRS-position beacon, e.g. short info about the trip etc. The maximum length of the status text is 62 characters. A longer status text will be refused with an error message. A "minus-sign" (-) as status text resets the comment to "NONE", i.e. erases it.

STONE (,,STatus ON Every X Beacons")
Value range: 0-100
Default value: 0

Defines how often the APRS-status beacon (providing the "APRS Status" text is available, see above) will be sent. With the value 0, a status-beacon will never be sent. The status-function is turned off. With the value 1, an APRS-status beacon will be transmitted after every APRS-position beacon. The value 2 means that the APRS-status beacon is sent after every 2nd APRS-position beacon, … etc. The higher the "APRS STONE"-value is set, the less frequently appears the status-information on the APRS-channel. This relieves the channel occupancy, but means also that it can be a relatively long time before a newly arrived APRS-client can receive the status information on the APRS-channel.**2.1.13 SYmbol**
Value range: 1-94 or a1- a94 perhaps followed by 0-9 or A-Z (as "Overlay")
Default value: a13 [House (HF)]

Defines the graphical APRS-symbols that an APRS-receiving program should show, e.g. a stylized car for mobile operation (symbol 30). The symbol numbers exactly follow the specification in the tables of the APRS-protocol Version 1.0. The complete protocol information with the tables is available on the internet. Symbols from the alternative table ("alternate table") can be chosen by inserting an "a" before the symbol number. E.g. "APRS SY a13" for "House [HF]".

With some symbols of the alternate-table, an optional "overlay" character can be given. This "overlay" character is laid over the actual symbol. So it is possible for example for a car to be

numbered, just by choosing the Symbol a30 ("Car") followed by the number which should be overlaid. E.g.: "APRS SY a30 1" when the number 1 should be shown as "Overlay". The characters 0-9 and A-Z are permitted as "Overlay" characters. The following symbols can carry an "overlay": a3, a6, a16, a30, a33, a55, a62, a63, a65, a67, a73, a78, a83, a85, a86.

If no symbol number is given as argument, the "APRS SY"- command (as usual) displays the presently set parameter value, but with frequent symbols in addition with a short description in brackets, e.g. a13 (House [HF]).

Here is a selection of frequent symbols and their numbers:

6: HF-Gateway	7: Small Aircraft	13: House QTH [VHF]
a13: House [HF]	15: Dot	27: Campground
28: Motorcycle	30: Car	47: Balloon
50: Recreational Vehicle	53: Bus	56: Helicopter
57: Yacht [sail boat]	65: Ambulance	66: Bicycle
70: Fire Truck	74: Jeep	75: Truck
83: Ship [power boat)]	86: Van	

TImer
Value range: 0, 10-7100 [Seconds]
Default value: 900

Defines the APRS-position beacon interval in seconds. With a default value of 900, the APRS-beacon is sent every 15 minutes, provided position data as well as a Mycall (as sender address, see also "APRS MYcall") is available.

If the course changes - by more than 30 degrees, when the speed is approx 5 km/h or more - then generally an additional beacon will be inserted. This function serves, together with the "Local-Range"- function, (see "APRS Local") for "Automatic beaconing" for exact and efficient tracking of the position information.

Parameter 0 sets the beacon transmission in operating mode GPS (APRS 1) to speed dependent automatic operation. Here a try is made to send the beacon at a constant distance (in meters), depending on the setting of the "APRS AUTOEvery"-parameter, see above.
With the default setting AUTOEvery 1000 and with a TImer-setting of 0, the P4dragon will try to send a beacon every Kilometer travelled. The minimum possible time difference between two beacon transmissions is 10 s, the maximum difference is 1800 s. If the P4ragon uses the Fix-position in Automatic-timer mode, or no speed information is available from the GPS-receiver, then the beacon is sent at intervals of 1800 s.

Comments for software developers

The P4dragon modems show in MIC-E-format the following two byte hardware identifier:

:8 for DR-7800,
:4 for DR-7400.

The colon is generally used in SCS-products as a "Manufacturers Byte" used in MIC-E-format. The following byte gives the modem type.

This two byte hardware identifier is also sent by the P4dragons with BASE91 transmissions instead of the course or speed. They appear right at the end of the compressed position data after a space character, so the complete sequence in BASE91-format looks like the following: " :8" or " :4".

3. Other improvements and corrections

- Command "fax fmfax" supported now. As soon as this command is detected, the P4dragon starts sending FM-Fax data in terminal mode at 3840 samples/second. 0xFF, entered at the user interface, stops that mode again. The "fas fmfax" feature serves as compatibility mode for the MSCAN software. MSCAN can demodulate FM-Fax signals using that legacy command.

- Sporadic problems on P4 connections using "Longpath Option" fixed.

SCS

Spezielle Communications Systeme GmbH & Co. KG
Röntgenstraße 36
63454 Hanau
GERMANY
Internet: www.p4dragon.com
Email: info@p4dragon.com

Tel.:   +49(0)618185 00 00
Fax.:   +49(0)618199 02 38